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ABSTRACT

Presented is a description of a K-12 interdisciplinary design for environmental education programs developed by the Division of Curriculum of the Indiana system of public instruction. The publication is designed to assist administrators and their teaching staffs in developing meaningful environmental education curricula and related activities which focus on real life experiences in the local school community. Suggestions are provided for a plan to be followed in designing a K-12 multidisciplinary program. The material is divided into seven chapters: Environmental Education - What It Is, The State Environmental Education Design, Challenge to the Environmental Education Teacher, Local School Curriculum Development and Implementation, Model Environmental Education Units, Environmental Education Instructional Objectives, and Curriculum Resources. An Indiana school district, the New Albany-Floyd County School Corporation, has implemented this curriculum design but did not have dissemination materials available at the time this publication was prepared. (PEB)

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total environment education

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FOREWORD

The energy problem has reached a crisis proportion in Indiana and the United States. Environmental authorities predict that many schools may have to be closed this winter because of fuel shortages. Many farms and industries will also be affected.

Other environmental problems are also threatening the quality of life in this state and country. Water pollution, air pollution, noise, visual blight, solid waste, destruction of wildlife habitats and the loss of valuable farm land to shopping centers and housing projects are just a few of the many issues and problems facing this nation.

The task of halting the destruction and depletion of our resources will be accomplished by many people getting involved in community, state and national environmental projects. TOTAL ENVIRONMENT EDUCATION suggests ways educators and students can get involved in projects to improve their communities. It is an action-oriented design which asks educators and students to stop, look, think, analyze and actively pursue activities to improve their environments.

The Indiana Department of Public Instruction encourages all teachers and students to participate in this unique and relevant environmental education program.

Harold H. Negley

Harold H. Negley,
State Superintendent of Public Instruction

Prepared by the

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for the

State of Indiana

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I. ENVIRONMENTAL EDUCATION--WHAT IT IS

Many Americans are concerned about the degradation of our environment, which diminishes the quality of the human experience through: water deterioration, waning wildlife, urban sprawl, preempted open spaces, vanishing wilderness, noise, landscapes scarred by highways, litter and blight. This crisis is destroying beauty and increasing contamination, thus threatening not only the pursuit of happiness but also life itself.

Action to conserve the remaining natural environment and to maintain it will require a sense of husbandry and a sense of responsibility on the part of every American citizen. Unthinking people pollute the environment. Thinking people can effect a new environmentalism dedicated to: restoring as well as protecting, bringing beauty to the cities as well as the countryside, minimizing the waste of technology as well as natural resources and halting the massive deterioration of the environment as well as husbanding resources and values essential for the prosperity of the human spirit.

This, then, is environmental education: a recognition by man of his interdependence with his environment and all of life and of his responsibility for developing a culture which maintains that relationship through policies and practices necessary to maintain an environment fit for life and fit for living.

What is the difference between the new "environmental education" and the older "conservation education"? The newer term attempts to describe more precisely our efforts to come to grips with the degradation of man's surroundings from an ecological approach.

The scope of the new environmentalism is all encompassing. Whereas yesterday soil conservation, water conservation, forest conservation, wildlife conservation, etc., were treated as separate units, today the ecological unity of all man-land relationships is the unit for study. Thus, the focus of the new environmentalism is man-centered; i.e., the primary concern has shifted from the survival of remnant redwoods and other endangered species to the survival of nothing less than the human species itself. The concern is not so much for the quantities of natural resources as for the quality of human experiences. Where conservation conjured up images of open country, "environmentalism" includes these images but, in addition, incorporates the pressing problems of the city. The emotional bases of the new environmentalism is founded more on concern for man's tomorrow than on love for nature's yesterday. Yet, to improve the environment the patterns of "nature's yesterdays" must be taken into account. Man cannot develop a natural environment.

It is in its basic cultural orientation, however, that the new environmentalism differs most strikingly from its antecedent, conservation. The latter, in the words of Gifford Pinchot, stood clearly for economic development, for the infinite goodness of American "progress." But environmentalism reflects a growing suspicion that bigger is not necessarily better, slower can be faster and less can be more.[1]

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1. Comments above adapted from an article by: Schoenfeld, Clay, "Toward a National Strategy for Environmental Education;" The Journal of Educational Research, Vol. 64, No. 1, Sept. 1970, pp. 5-11.

These principles suggest that the emphasis of an environmental education curriculum be the development of a citizenry which is knowledgeable of the biophysical environment and its associated problems, capable of resolving them and motivated to do so. The inclusion of environmental education in the school program is a response to a need--a need for citizens who can identify and resolve problems affecting the quality of the environment. Good citizenship is already a goal of the school. Environmental education helps the school achieve it, not by adding a new subject area to an already overcrowded curriculum, but by working through existing curricula to make education relevant and responsive to societal needs. Its objective is the development of strong, rational attitudes essential to the development of values which will motivate action to resolve environmental problems.[2]

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2. Comments above adapted from the definition of environmental education: Organization and Operation, Regional Environmental Education Center, Yarmouth, Maine.

II. THE STATE ENVIRONMENTAL EDUCATION DESIGN

Six global objectives have been used as a framework in preparing this design. These global objectives emphasize behavioral change in the affective domain. As students progress through a set of learning experiences, the major goal should be to change attitudes. The six global objectives are:

A. The student will support and practice wise utilization of traditional sources of energy and also support expenditures for research and development of alternate energy sources.

B. When faced with decisions concerning the use of earth resources, the student will select practices developed in recognition of present and future needs.

C. The student will voluntarily participate in purposeful programs involving resource reclamation.

D. The student will demonstrate his awareness of population processes and dynamics by effectively defending a position on population management.

E. The student will demonstrate an appreciation for the interdependence of living things in the closed earth system.

F. The student will examine optional courses of action and their consequences for improving the quality of life and will support those that will provide optimum short- and long-term benefits for himself, society and the environment.

To aid classroom teachers and school districts in achieving these goals, this guide is divided into several chapters.

Chapter III deals with the role of the teacher in the classroom situation.

Chapter IV provides suggestions for implementation of an ongoing environmental education program in terms of the responsibilities of the district.

Chapter V develops several model units incorporating the instructional objectives, possible student activities and teaching aids.

In Chapter VI, each global objective is restated with specific supporting instructional objectives. The lists of specific objectives also contain indicators of the curriculum area in which it is believed they are most appropriate.

Section VII provides names and addresses of agencies and individuals who can provide free and inexpensive materials to supplement the environmental education program.

III. CHALLENGE TO THE ENVIRONMENTAL EDUCATION TEACHER

To teach students to make rational decisions about the continually changing problems of society, the teacher must arrange conditions so that a student will think rather than memorize information and facts. To teach for the future, it is essential that teachers assist students in refining their thinking.

To refine these skills, the teacher gently guides by questioning, observing and listening carefully to the thoughts and questions of the students. He suggests possible approaches to the solutions of problems without giving the answers. The teacher provides the student time for ideas to form and for absorbing what they are learning. Also, time is allowed for the formation of values.

It is also the responsibility of the teacher to be realistic about what students can do and plan the work so students may achieve the desired changes in attitudes.

TEACHING STRATEGIES*

A. Environmental Education is Future-Oriented

Environmental education recognizes that man has a hand in shaping his future and that we teachers and students have a hand in developing the strategies and means which will determine what our future will be like. It is an important aspect of environmental education that students have opportunities to identify possible future roles. Activities should be so designed as to make this a probability. Future orientation can become the keystone of the teaching/learning strategy. It is essential to environmental education and to scientific literacy - a long stated goal of education.

B. Environmental Education Is Problem-Focused Learning

Problem-oriented education requires experience in applying knowledge to a particular problem area drawn from the place where we live, our environment. A problem is first recognized if it causes a conflict for the individual student. What may be recognized as an environmental problem for educators may be of no concern to a student.

The nature of available problems for study depends upon the environment of the student. Ecological problems of ample dimensions exist in the rural areas of Indiana as well as the core areas of our larger cities. The new environmentalism requires every teacher to apply the knowledge that is being developed to problem situations which are learning concerns for students.

C. Environmental Education Is a Recognition of Man in His Environment

The questions of man's social responsibility to his environment become the concern of all teachers and students. It calls for a new awareness on the part of teachers and students, an awareness which recognizes man as an integral part of his environment.

D. Environmental Education Is Interdisciplinary Education

Environmental education will be more effective if the knowledge, concepts and processes of all current disciplines are available to the problem solving situations.

Each analysis, be it scientific, sociological, political or economic, produces information and constraints. Each set of data is necessary but separately does not provide a complete base for decision making. Students must have the opportunity to do multi-disciplinary analyses of problems and to bring into confrontation

the divergent results of many pertinent analyses.

Environmental education presupposes the existence of such interdisciplinary learning and assumes full involvement of teachers with students. It assumes that students will often be confronted with inconsistencies inside and outside of the schools. Yet, it embraces the conviction that an interdisciplinary approach to learning provides the necessary experience for the making of informed decisions.

E. Environmental Education Is Student-Initiated Learning

If we expect students to take the initiative in producing new information and to make wise decisions after they leave school, then experience must be provided and expertise developed within the school program. Environmental education requires that students have a major role in the selection and execution of available learning activities.

F. Environmental Education Is Community-Centered

Programs in environmental education can be strengthened by encouraging interaction between students and representatives of the various sectors of a community. The personnel resources of a community can provide meaningful and supportive assistance to an existing program through motivational and instructional services.

*Adapted from an article written at The University of Wisconsin, Green Bay, 1972.

IV. LOCAL SCHOOL CURRICULUM DEVELOPMENT AND IMPLEMENTATION

A. Three Components of a Good Environmental Education Program

To maximize the impact of its environmental education effort, a school district should develop a total program composed of at least three components. The most important of these is a curriculum which includes a sequential, expanding program of learning experiences designed to develop specific attitudes, conceptual understandings and skills in problem identification and solution. These activities should be supported by a resource center where students and teachers can obtain materials and aids on a variety of environmental topics. The activities should also be supported by a series of sites at the school and in the community which can be used as a learning environment and/or as examples of environmental management.

1. The Environmental Education Curriculum

The school district should have an overall curriculum design for accomplishing its goals in environmental education. This design would provide a framework around which to organize the total program, but it should not dictate the specific instructional activities on a day-to-day basis. Rather, it should outline the objectives of the program and suggest possible activities and strategies for accomplishing these objectives while permitting the teacher freedom in sequencing activities in terms of an individual student's development and interest.

The environmental education program should not become a separate discipline in the K-12 curriculum but should be one focus

of each of the current instructional areas of the school program. As each of these areas contributes to education for citizenship in humanity, it should include learning activities which lead to the development of wholesome attitudes and values about the human environment and related problems.

An effective environmental education program, therefore, would be one that is integrated into each school discipline. However, at the high school level, separate environmental courses, or mini-courses, may be developed for students who have a particular interest in investigating environmental problems in depth. On the other hand, a school system should not conclude that by introducing only such courses it is discharging its responsibility for providing environmental education. Such courses neither reach enough students nor provide a sequence of learning activities for developing values adequate to promote a responsible environmental life style.

The school system's environmental education curriculum development program should also include a definite plan for evaluation of the curriculum. This evaluation should not focus on the ability of students to memorize information but on how effectively the goals and the objectives of the program are being accomplished. The evaluation, therefore, should investigate the actions of students in regard to their approaches to environmental problems.

2. The Resource and Enrichment Center

Each school system should develop an environmental education materials center. This center may be part of a centralized instructional media center, part of an environmental education facility or

exist as a separate facility, but always it should include a wide variety of instructional materials which students and teachers can procure for resource or enrichment purposes. Types of materials available from the center should include: natural specimens, charts, books, maps, pamphlets, special field equipment, periodicals, films, filmstrips, slides, other audiovisual aids, etc.

3. School and Community Site Development

A good environmental education program will take students into an environment when appropriate. School sites offer an easily accessible learning environment where problems, projects and other activities can become real and meaningful.

The local environmental education development program should involve a steering committee for school and community site development consisting of citizens, administrators, teachers, and students and special consultants or advisers. This committee would oversee the development of sites for educational use, environmental improvements such as landscaping and beautification, and community use such as natural outdoor recreational areas for citizens and visitors. Student involvement should be stressed in the development of these sites as in the selection of other sites in the community which may be used as examples of environmental management practices.

B. Implementation of an Environmental Education Curriculum

The implementation of a comprehensive environmental education program will be facilitated by a district implementation plan. Some of the necessary components of an effective plan are: (1) an environmental education coordinator, (2) an environmental education

committee, (3) an inservice program for teachers and (4) an inventory of the local community. Each of these is discussed in greater detail below.

1. Environmental Education Coordinator

The environmental education coordinator, working part- or full-time in a school system, is a key to implementing a total environmental education program. This coordinator:

a. Can provide continuity and coordination for an interdisciplinary K-12 program. He should have the background and time to keep abreast of community environmental plans and developments and coordinate their use into meaningful learning experiences.

b. Can provide a direct link between the school and community environmental education learning experiences and projects.

c. Can provide inservice teacher training and cope effectively with any continuity problems which might occur because of teacher turnover.

d. Can contribute to meeting adult education needs related to community environmental education.

e. Can become a resource for students engaged in independent and group environmental studies and activities

2. Environmental Education Committee

A local environmental education committee provides a resource for the coordinator or, where no coordinator exists,

provides for the direction and implementation of a program. It is recommended that where an overall school curriculum committee exists, the environmental education committee be a working sub-committee under its direction. The committee should consists of local citizens, community officials, school administrators, teachers and citizens. It would be helpful for the committee to have access to a consultant who has special training and/or experience in environmental studies, particularly should such a person be available during the committee's early deliberations.

Among the committee's duties are:

a. Assist the school in preparing the basic philosophy, goals and program structure. The state guidelines will provide many ideas.

b. Plan and participate in a comprehensive community environmental inventory upon which to base a K-12 environmental education curriculum. (One outline which could be used in undertaking such an inventory is given in "4" below.)

c. Assist in the selection and planning of developmental phases of school sites as environmental interpretive centers.

d. Assist in the organization and operation of an environmental education resource center for the school and community.

e. Assist in planning, organizing and implementing teacher inservice programs for the development and implementation of a K-12 environmental education curriculum.

f. Develop a plan for implementing the program throughout the school district.

g. Assist in providing for evaluation and use of results.

h. Assist in acquainting the community with the environmental education program and in seeking community participation.

3. An Environmental Education Teacher Inservice Program

One part of the inservice program might be a workshop designed to: (1) acquaint teachers with environmental education, (2) introduce them to objectives, possible activities and related teaching strategies, and (3) assist them in planning student learning activities which have "affective" impact.

Such a workshop program might be limited to a single session but would be more effective if spread over a period of time involving several sessions. One suggested organization of this type of workshop is given below.[3]

a. Introduction to environmental education

The need

Definition and major objectives

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3. "Organization and Operation," Regional Environmental Education Center, Yarmouth, Maine, p. 9.

Instructional objectives, activities and evaluation

b. Presentation of objectives and curriculum structure

1. Attitude development objectives.

a. Affective

b. Cognitive

2. Skills and behavioral processes

a. Problem identification

b. Decision-making

3. Curriculum structure and teaching organization.

a. Suggested program sequence

b. Suggested teaching methods

c. Field Experience

1. Community inventory (See "4" below)

2. School site survey

d. Development of teaching strategies

(See Chapter III)

4. Local Relevance

To be most meaningful to students, all curriculum, especially environmental studies, must relate to problems which the student can see and understand. Thus, teachers, committees and coordinators must identify local conditions which they can use in designing the environmental curriculum.

To focus on such local conditions, an organized inventory of the local community's resources and problems must be undertaken. This inventory can be done by the local Environmental Education Committee, the teaching staff during in-service training, or

both. The combination of efforts would probably be most effective as each group would be focusing on different potentials of the existing conditions. The Environmental Education Committee would most likely be looking for areas of concern and general resources while the teachers, during an in-service program, would be directed to sharpen their awareness of local problems and examine the potential of specific elements of the existing environment.

One of the instructional potentials which teachers may discover in such an activity could be the value of allowing student groups to independently carry out a local inventory.

The following outline of concerns to be included in a local inventory was developed by the University of Wisconsin at Green Bay and may be useful to local groups as they undertake these studies: (See next page.)

ENVIRONMENTAL LEARNING OPPORTUNITIES - KEYS TO AN EFFECTIVE CURRICULUM

Consider carefully each of the environmental problems and then construct notes on local examples of these problems of interest and concern to students at each grade level.

1. GREEN BELTS, NATURAL AREAS, LEISURE AND RECREATION.
   What groups are competing for use of local land areas? What are some needs which exist for Green Belts in your area?
2. WILDLIFE RESOURCES, ECOLOGICAL CYCLES AND CHEMICALS.
   What are some of the values and details of local plant-animal-energy cycles which could appropriately be used at your school level? How is the problem of recycling natural resources handled in your community? What chemicals which interfere with these cycles are commonly released in your community?
3. POPULATION CONTROL-FAMILY PLANNING-FOOD SUPPLY.
   What will be some of the effects of population growth on your community? What mathematical examples can be developed at an appropriate school level? What are natural mechanisms for regulating population size? What programs exist in the local community?
4. ECOLOGICAL PROBLEMS IN AN URBAN ENVIRONMENT.
   What are the effects of long- and short-range planning? What land-use conflict examples can be cited? How can or have some of these conflicts been resolved?
5. SOLID WASTE DISPOSAL.
   What alternative solutions have been proposed in the local

community? What recycling efforts have been developed?

6. SANITARY WASTES AND WATER QUALITY CONTROL.

What are some of the problems associated with water quality control in the local community? How has water quality been controlled? How have the local groups been involved? What aesthetic, social, political and economic factors have been involved?

7. AIR QUALITY CONTROL.

What are the factors in air quality and needs for control in your community? What human values are involved? How can students measure different aspects of air quality?

8. TRANSPORTATION AND LAND-USE CONFLICTS.

What conflicts exist locally between transportation means and life style and limitation resources? What attitudes are involved locally concerning private versus mass transportation?

9. COMMUNICATION, NOISE, ADVERTISING AND QUALITY OF LIFE.

How do local and metropolitan area stimuli affect the quality of life in your local community? What behavioral changes are prompted by the printed and electronic media?

10. POWER CONSUMPTION AND DISTRIBUTION AND ECOLOGICAL PROBLEMS.

How is the local power generated and where? What local groups are concerned with making these decisions? What environmental conflicts exist over power generation and power use?

V. MODEL ENVIRONMENTAL EDUCATION UNITS.

When only objectives are provided, teachers sometimes have difficulty converting them into a program of student learning experiences. As a starting point, four model units have been expanded by suggesting one or more learning activities and related teaching aids for each objective.

One unit has been expanded for each of the grade level blocks used in classifying the objectives in Chapter VI, i.e., K-3, 4-6, 7-9 and 10-12.

In each of these units, one of the global objectives has been chosen and a series of instructional objectives selected. The suggested activities for students are designed to lead them to the behavior stated in the objective.

Student progress can be measured by asking the students (orally or in writing) to perform as specified by the objective. When students are unable to achieve the objective, the teacher should design a series of additional activities.

This procedure, of selecting global objectives, instructional objectives, designing activities, on-going evaluation and modification of the activities based on the evaluation, is highly recommended.

Obviously, many exciting things will happen during the environmental encounters which go beyond the objectives. Hopefully, students will get so involved in experiences that their attitudes towards the environment will improve. Other affective and cognitive developments may also take place during the experiences.

These suggested units emphasize the process of learning from

student fact gathering to the resolution of real community issues. They offer students an opportunity to make decisions based upon information and feelings required during relevant environmental studies. Remember, these are only suggested units. Teachers and school districts should feel free to add, substract and substitute activities, as well as objectives, as they strive to implement an environmental education curriculum that is meaningful locally.

1. A K-3 Model Unit

Global Objective E. The student will demonstrate an appreciation for the interdependence of living things in the closed earth system.

Instructional Objective 1. Provided with the necessary activities, data and information, the student will describe how people in his community are dependent upon other communities for food, clothing and shelter, e.g., consider grassland communities, oceanside communities, forest communities, etc.

Suggested activities:

A. Have students trace the foods used in a single school lunch to communities where they were grown.

B. Have students collect pictures of traced foodstuffs while they are growing and/or being processed. If the source or processing plant is close by, take students there on a field trip and have them take their own pictures.

C. Have students interview or write letters to people

who raise or process the foods and ask questions about their processes.

Note: A similar set of activities could be developed for the clothes the students are wearing, the houses they live in, the water they drink, the products they use in any one day, etc.

D. Have students imagine what their room would be like if all the products from a given resource were removed, i.e., forests, water, iron ore, clay, etc.

Instructional Objective 2. Provided with----the student will describe ways in which man's presence in his community has produced changes from its original natural state. (Construction of roads, bridges, houses, businesses, factories, etc.)

Suggested activities:

A. After taking a walking tour through their community, have students develop a map of their neighborhood and locate predominant natural features on the map (rivers, lakes, hills). On the map draw in the predominant features that are man-made (roads, bridges, railroads, houses, businesses, factories). On the map have the students identify their own homes.

B. Have students classify man-made features on the basis of function, such as those used for

transportation, shelter, food distribution, utilities, recreation, etc. Have students imagine how their community would have looked before the man-made features appeared. Have them draw pictures of how the school or some other area looked at that time.

C. Have a long-time resident of the community visit the class and describe how the community looked when he was a student. Students may be able to identify changes that developed during that individual's lifetime.

D. In addition to the visual changes identified in the above activities, students might close their eyes and identify sounds or odors that are man-made and sounds or odors in their community that are natural.

Instructional Objective 3. Provided with----the students will learn to recognize some animals by name through pictures and deduct from a picture of a set of animal tracks where it came from and what it might have done.

Suggested activities:

A. Using a set of film strips or picture collections of both common, domestic animals and native, wild animals, the student should become familiar with the animals. The teacher should, whenever possible, substitute experiences with live animals for

vicarious experiences. Trips to farms, zoos, etc., or the bringing of small animals into the classroom, should be encouraged. (Remember, animals may include insects, reptiles, birds, etc.)

B. The class might develop a collection of plaster casts of animal footprints. Students could match the animal footprints with the picture and name of the animal.

C. After a rain shower or new snow fall, the students might take a walk in the community and look for animal tracks, tracing where the animal came from and where it went. They could also construct an inference of what type of animal it was and what it did. (The sets we would find in an urban area would not be the same as those we might find in a rural or surburban area.)

D. The teacher, using a Polaroid or 35 mm. camera, might take pictures of the animal tracks the students discovered for discussion in the classroom.

E. Students might draw sketches of the tracks they found and write a creative story about the animal.

F. Student tracks might be followed, also, and similar inferences constructed. Children could follow the human footprints made on fresh snow or

in some mud, if the footprints had some unusal or readily identifiable characteristics.

2. A 4-6 Model Unit

Global Objective B. When faced with decisions concerning the use of earth resources, the student will select practices developed in recognition of present and future environmental needs.

Instructional Objective 1. Provided with----the student will select a local stream, pond or lake and map the area draining into it.

Suggested activities:

A. Define the term "watershed."

B. Have students locate on a map the sources of water for their community.

C. Take a field trip to a given area within the watershed and have students locate this area on the map.

D. Discuss drainage patterns noted during rain.

Instructional Objective 2. Provided with----the student will explain the sources of water for the local watershed.

Suggested activities:

A. Have the students explain in a class play how the water cycle benefits the watershed.

B. List the various kinds of precipitation which supply water to the shed, i.e., rain, snow, sleet, etc.

C. Explain how man's manipulating his environment has affected the source and quality of water supply for his watershed, i.e., compare the runoff from a paved area or large building to a grassy or natural area of the same size.

Instructional Objective 3. Discuss the natural and man-made problems of the local watershed.

Suggested activities:

A. Photograph or draw pictures of environmental problems discovered during a field trip.

B. Write a story which describes how the life of a frog is affected by pollution.

C. Role play a citizen living in this community in the year 2000.

1. What will he use for water if this watershed continues to be contaminated?
2. What are some recreational activities now available which may be unavailable at that time?
3. If the water here is unusable, where in this solar system might man be able to go to find a usable source?

Instructional Objective 4. Provided with----the student will construct a series of food chains within the watershed and explain their importance for insuring a quality water supply.

Suggested activities:

A. Ask students to respond to the following questions:

1. What is a food chain?
2. How do these food chains benefit you?
3. Can we do without them?

B. Visit the school library and local watershed to gather data and collect specimens for determining food chains.

1. Use the data and specimens collected to construct a series of chains.
2. Explain what would happen to the local watershed if one or more food chains were disrupted.
3. Write a short story depicting life in this community in the year 1990, after man has destroyed all food chains within the local watershed.

C. Ask the students to prepare a panel debate, class play, mock television program or multi-media program depicting how destruction of the local water supply food chains affects the quality of life for them and their community.

1. Photograph damages already evident.
2. Tape interviews with local authorities and citizens.
3. Compile a list of questions which students and citizens have about their watershed.

Instructional Objective 5. Provided with----the student will

compare plant and animal watershed life in the winter months to life in the spring.

Suggested activities:

A. Take a field trip to a chosen area and observe it during different seasons.

1. List forms of life found in warm seasons as compared to forms observable in winter.

2. Have students make inferences about what happens to different life forms during the winter.

a. Where have the birds gone?

b. What happens to frogs during the winter?

c. If we take a chunk of ice back to the classroom and melt it, do you think we may see different kinds of life?

d. If animals are living in the pond during the winter, how do they survive?

B. Have the students write and implement a class play which tells the story of a pond community's struggle for a balanced environment.

Instructional Objective 6. Provided with----the student will explain how a heavy rain affects the soil, plants, animals and people in or around the watershed, i.e., fertilizers, pesticides, insecticides, oil, salt, and sewage are often washed into the local watershed.

Suggested activities:

A. Go outside during a rain and have students take notes on observations made.

B. Visit the local sewage treatment facility and ask what happens to sewage during a heavy rain.

C. Trace the runoff from a service station, farm or factory during or after a heavy rain.

1. What pollutants do you think were here before the rain?
2. Where did they go?
3. What effect do they have on the local water supply?
4. What suggestions do you have to improve this environmental problem?
5. Can we afford to continue these practices?
6. Are laws sufficient----are they being enforced? etc.

Instructional Objective 7. Provided with----the student will draw a map tracing water supplies from the school to its source.

Suggested activities:

A. Ask the county surveyor or city engineer for a drainage map.

1. Locate the school on the map.
2. Draw a map which shows how water reaches the school.
3. On the map, indicate where runoff water and sewage go after it leaves the school.

B. Have students follow their map to the point where the runoff water and sewage is discharged.

C. Have them list the advantages and disadvantages of the present system.

Instructional Objective 8. Provided with----the student will explain how the local water supply is treated and how this treatment affects the health, economics and recreation potential of the community.

Suggested activities:

A. Ask the county sanitarian for information about the local water supply.

1. What are the problems?
2. What are projected needs?
3. Is the water treatment expensive?

B. Photograph or collect pictures which demonstrate how water is used in his community.

1. In what ways is water being misused?
2. What suggestions do you have for reducing consumption of water?

C. Survey the school to determine how wisely water is being used.

1. Develop a water use plan for the school.
2. Develop a water use plan for the student's home.

Instructional Objective 9. Provided with----the student will construct several food chains from collections made at the

watershed.

Suggested activities:

A. Use dip nets and let students collect life specimens. Locate a safe place for students to collect them.

B. Place specimens in collecting pans so students can make observations.

1. In what ways is each animal adapted for living in the water?
2. Where do you seem to be finding most life? Why?
3. Why can't you see all forms of life?
4. Why should we take samples of the water back to the classroom?

C. Take microscopic specimens back to school and allow the students to observe them under a microscope, bioscope, etc.

1. Why did we bring these specimens back to school?
2. What can we learn from this study?
3. Why is small life just as important as large life?

Instructional Objective 10. Provided with----the student will write a creative story, poem or play which explains the value of food chains to an adequate water supply.

Suggested activities:

A. Assign to each student one animal or plant in the watershed and have him prepare a report

which explains its importance.

1. What is its function in or near the water?
2. What would happen to the water without this plant or animal?
3. What does it do for man?
4. What does man do for it?

B. Predict the consequences of a factory or housing project constructed near the water supply.

1. In what ways will this affect the water?
2. What are the environmental decisions which must be made to prevent destruction of the ecosystem?

Instructional Objective 11. Provided with----the student will write a description of the watershed.

Suggested activities:

A. Have the students take various measurements of the watershed.

1. What is the temperature of the water?
2. What biological forms does the river or stream have?
3. How much sediment is there in the water?
4. How many man-made disturbances are there?

Instructional Objective 12. Provided with----the student will deduce from the above studies a number of probable causes for watershed degradation.

Suggested activities:

A. Have the student preview filmstrips and films and study in textbooks and other materials the factors relating to stream degradation.

1. Have a representative from the Soil Conservation Service speak on the types of soils along the watershed.
2. Ask a member of the local planning board to speak on activities along the river.
3. Interview an older citizen of the community and record his description of the watershed thirty years ago.
4. Locate old and recent newspaper articles which describe the watershed's past and present use and misuse.

Instructional Objective 13. Provided with----the student will develop a plan for improving the watershed.

Suggested activities:

A. Discuss possibilities of what has been learned into a workable plan of action such as:

1. banks to hinder erosion.
2. letters to government, industry, etc.
3. a plan of action to implement.

B. Have the student develop an Ecological Water Use Plan for his life.

3. A 7-9 Model Unit

Global Objective F. The student will examine optional courses

of action and their consequences for improving the quality of life and will support those that will provide optimum short- and long-term benefits for himself, society and the environment.

Instructional Objective 1. Provided with----the student will calculate the water yield and water consumption for his county and relate these calculations to projected water needs.

Some suggested activities:

A. Have students secure data from which they can plot and calculate the average local annual rainfall for the past few years. Suggested sources: local weather station records, U.S. Weather Service, newspapers, unofficial local sources, etc.

B. Have students obtain the official area of the county and calculate the amount of water falling on the county annually.

C. Have students collect and process data from which they can calculate or approximate the annual water consumption within the county.

D. Have students classify various types of water usages in the county.

E. Have students interview local governmental, institutional and business authorities to determine projected changes in water needs for the county.

F. Have students extrapolate their graphs and/or other sources of information to predict any projected change in local rainfall.

G. Have students analyze water sources used in the county to locate non-local precipitation supplies of water and estimate the effects that changing upstream environments may have on these supplies.

H. Have students write papers, prepare speeches, develop A-V presentations, etc., to report conclusions that they have reached concerning the present local water supply and needs.

I. Have students classify local water uses as to the water purity needs.

Instructional Objective 2. Provided----the student will compare the quality of local surface water with rain water.

Suggested activities:

A. Have students collect samples of surface water (including water from streams and impounded supplies) at various times (immediately after a shower, immediately after a downpour, after a drought, etc.) and analyze these samples for chemical and biological impurities.

B. Have students collect samples of rain water at various local sites and compare purities.

C. Have students compare the purity of surface water collected at a given site with that of the rain water sample collected nearby.

D. Have students infer causes of differences in the purity of rainwater and surface samples.

E. Have students devise and implement a plan to test their inferences.

F. After having validated a cause of localized water pollution, have the student suggest adverse and beneficial environmental effects of the pollution by answering questions such as:

1. Was the pollution source natural or man-made?
2. Does the pollutant help remove another pollutant from the water? Is this beneficial or not?
3. Does the pollutant provide nutrients for water life? If so, will this source of pollution cause an overpopulation of some species of water life?
4. If the pollutant had been reclaimed at its source, are there more advantageous uses for it?

4. A 10-12 Model Unit

Global Objective C. The Student will voluntarily participate in programs involving resource reclamation.

Instructional Objective 1. Provided with----the student will list types and amounts of solid waste on the school site (in the community).

Suggested activities:

A. Tour the area, take pictures and list types of solid waste observed, map the locations with transparencies.

B. Set up a control test area for litter.

C. How much waste does the school produce daily?

Instructional Objective 2. Provided with----the student will list sources of solid wastes and how they are disposed of.

Suggested activities:

A. Trace the school waste.

B. Describe various present disposal methods.

C. Why were these methods selected?

D. List solid waste.

Instructional Objective 3. Provided with----the student will describe the effect solid waste has on man's social, psychological and physical needs.

Suggested activities:

A. Consult town reports.

B. How much does solid waste disposal cost?

C. Interview various people, such as town manager, maintenance men, dump caretakers, etc., to determine costs, problems, etc.

Instructional Objective 4. Provided with----the student will identify and list federal, state and municipal laws governing the disposal of solid wastes.

Suggested activities:

A. List federal, state and municipal laws governing solid waste disposal.

B. Do they meet present day needs?

C. Which ones are obsolete? Why?

Instructional Objective 5. Provided with----the student will list authorities responsible for solid waste disposal.

Suggested activities:

Develop an organizational chart.

Instructional Objective 6. Provided with----the student will list acceptable methods of solid waste disposal applicable to the area.

Suggested activity:

Invite guest speakers such as a soil conservationist, sanitary engineer, town manager, town planner, etc.

Instructional Objective 7. Provided with----the student will select a method to resolve a solid waste problem, if one exists, on the school site.

Suggested activity:

Conduct a class discussion of alternatives.

Instructional Objective 8. Provided with----the student will design a plan of action.

Suggested activity:

Consideration of school solid waste policy, delegation of duties, time schedules, etc.

Instructional Objective 9. Provided with----the student will carry out a plan of action.

Suggested activity:

Implement the solid waste disposal policy.

Instructional Objective 10. Provided with----the student will analyze results of the action.

Suggested activity:

A. What was the reaction to the solution to the problem?

B. What further measures are necessary?

VI. ENVIRONMENTAL EDUCATION INSTRUCTIONAL OBJECTIVES

Learning activities can be organized most effectively by carefully describing a sequence of observable and measurable behavioral changes which are indicators that desired steps in the learning process have occurred. Although specific instructional objectives aid the teacher in effectively assessing the progress of the student and in prescribing challenging new experiences for him, it is unlikely that any set of prestated instructional objectives will ever circumscribe the learning that even one student will absorb from an organized series of experiences. As a teacher gains experience in preparing and implementing instructional objectives and using them as a criteria for assessing individual student learning, he will increase his capability to describe more completely learning outcomes in behavioral terms; however, this ability can never be entirely perfected. Also, the action described by any behavioral objective only identifies an overt student behavior which may indicate that the desired learning has occurred; it is only after the student displays many varied actions over a period of time that there can be real assurance that he had a complete learning experience. For the reasons above, any set of behavioral objectives will only partially describe the desired learning outcomes.

As a school district accepts its responsibility to infuse an environmental program into its curriculum, it may need suggestions about the kinds of activities which will aid students in eventually

internalizing an environmental ethic. To assist in this endeavor, a series of instructional objectives follows for use as an initial pool from which schools can draw as they begin developing programs.

In writing these objectives, the committee has tried to avoid describing specific activities and to keep each one broad enough that a variety of activities can facilitate its achievement. It is hoped, that, as teachers and local curriculum committees examine these objectives for ideas in the development of their programs, many locally applicable activities will emerge and that other objectives and activities will be developed which extend the program and its implementation proceeds.

The objectives in the design have been written and classified under the six major global objectives. For each objective, the grade level and subject areas into which it may be logically infused has been suggested. Writing activities for each instructional objective was considered, but it was felt that classroom teachers are better qualified to develop specific activities to meet local needs and conditions; however, four model units containing possible learning activities were included in Chapter V.

This publication is presented to the schools of Indiana not as a curriculum but as an aid for enriching their programs. This design is not meant to be all-encompassing. It is the beginning of a K-12 interdisciplinary environmental education program.

The coding in this guide for curriculum areas is:

(H)-Health; (H.Ec.)-Home Economics; (LA)-Language Arts; (M)-Mathematics; (Psy)-Psychology; (SC)-Science; (SS)-Social Studies; (VA)-Vocational Agriculture. (I.A.)-Industrial Arts; (C.A.)-Creative Arts; (B.)-Business.

The fact that many disciplines are not listed in this coding does not mean environmental concepts cannot be infused into them. Reading, music, physical education, driver education, drug education and other disciplines can easily introduce relevant environmental experiences into their daily activities. (See Mark Terry's Teaching for Survival, available from Ballantine Books #02120-7-125. $1.25.)

Global Objective A: The student will support and practice wise utilization of traditional sources of energy and also support expenditures for research and development of alternate energy sources.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information, the student will:	Suggested Curriculum Areas
K-3	1.	identify and/or name sources of energy which he uses in his daily life.	Sc., S.S.
K-3	2.	trace items of clothing and food back to their energy source.	Sc.
K-3	3.	report to the class examples of energy in the community.	Sc., L.A.
K-3	4.	identify two examples in his school showing how energy is used.	Sc.
4-6	5.	use the oral or written word or the dramatic arts to portray his dependence on the sun.	Sc., L.A., C.A.
4-6	6.	identify positive and negative effects resulting from the production of electricity from chemical, thermonuclear and solar energy sources.	Sc., S.S., H.
4-6	7.	give examples of how the availability of energy and economic growth are interrelated.	Sc., S.S.
4-6	8.	relate the increased demand for energy to pollution and resource depletion.	Sc., H., S.S.
4-6	9.	propose options to the internal combustion engine	Sc., S.S., M.

		as a main source of power for public transportation.	
4-6	10.	compare life styles of societies having access to different energy sources.	Sc., S.S.
4-6	11.	list changes he can make in his own living habits which would place less demand on available energy sources.	Sc., S.S.
4-6	12.	relate changing world population to future energy supplies.	Sc., S.S., H.
7-9	13.	collect data on petroleum reserves and suggest practices which would slow the depletion of these reserves.	Sc., S.S., M.
7-9	14.	list and describe ways your community can better manage electrical energy consumption.	Sc., S.S.
7-9	15.	collect data on solid fossil fuel reserves and discuss the environmental impact of utilizing these reserves in various energy consumption modes.	Sc., S.S., H., H. Ec., V.A.
7-9	16.	discuss the feasibility of converting the electrical energy industry to a nuclear power base and compare the merits of such a proposal with other optional basic energy sources.	Sc., S.S., H., L.A.
7-9	17.	debate the proposition: "As population and harnessed energy expand, the environment will continue to sustain life in a quality manner."	Sc., S.S., H., L.A.

7-9	18.	develop programs which will promote concern for avoiding exploitation of our energy resources.	S.S., H., L.A.
7-9	19.	list convenience products (including packaging items) which he uses daily, describe their impact on our energy reserves and identify related habits he can develop to conserve energy.	Sc., S.S., H., H.Ec., C.A.
7-9	20.	plan and carry out activities to improve the energy management of the school.	Sc., S.S.
7-9	21	select a convenience product being advertised in the media and project the energy consumption which would result from mass utilization of it.	Sc., S.S., M.
7-9	22.	discuss how changing to battery or electric powered cars could simply be a shift from one pollution problem to another.	Sc., S.S., H., L.A.
7-9	23.	compare the energy (calories) used in cultivating an acre of land with that produced by the crops and discuss such "trade-offs" in terms of impact on fossil fuel reserves.	Sc., S.S., H.,
7-9	24.	identify energy problems that will be serious by the year 2000 if current practices are not changed and suggest necessary changes.	Sc., S.S.
7-9	25.	discuss how economic development practices can either enhance or disrupt the energy flow through food chains.	Sc., S.S., H., V.A.

7-9	26.	use various media to demonstrate man's energy dependence on the sun.	Sc., L.A.
7-9	27.	write an essay which compares and contrasts modern and ancient concepts of the sun.	Sc., L.A.
7-9	28.	use various media to demonstrate how man's desire for economic gains affected energy resources.	Sc., L.A., S.S., M.
7-9	29.	use various media to present evidence for the need to improve the management of our energy rescurces.	Sc., L.A., S.S., M.
10-12	30.		
	A.	collect data on the current rate of energy consumption and predict either the zero supply date or the steady-state date for two or more sources of energy.	Sc., S.S., M.
10-12	B.	project the environmental impact of the utilization of various energy sources. This impact study should consider not only the effects of the waste products of the utilization process itself but the environmental degradation that results from securing, transporting and processing the energy source for utilization, i.e., final consumption, and the energy requirements for these processes.	Sc., S.S., H.
10-12	C.	analyze man's needs in terms of energy requirements (both direct and indirect) and combine	Sc., S.S.

		this information with that derived from the two previous objectives to suggest the best energy source to be utilized in providing for each need.	
10-12	D.	analyze the American life style in comparison with various other life styles to propose a life style which would provide a balance in terms of energy pool and quality of life.	Sc., S.S., H.
10-12	E.	discuss the feasibility of discovering and developing new energy sources as others are depleted, e.g., undiscovered fossil fuel beds or improved technology for harnessing current resources.	Sc., S.S.
10-12	F.	propose mechanisms based on the second law of thermodynamics for harnessing the enthalpy to entropy energy flow of the earth system, the solar system and/or the universe. He may also: 1. evaluate the feasibility of implementing his proposal. 2. prepare a program to present the need for his proposals to his classmates, the community or other groups, or 3. construct a working model of his proposal.	Sc., S.S., H., L.A., C.A.
10-12	31.	project how implementing an apparent solution to a pollution problem may increase the demand on the earth's energy resources.	Sc., S.S., H.

10-12	32.	construct the food web for two or more dietary systems of different human societies and the corresponding food pyramids to compare the effects of various diets on the world's energy pool.	Sc., H.Ec., H., V.A.
10-12	33.	project the total environment cost of different modes of transportation that could be used for moving goods and/or people and select the one or the combination of modes which will provide an optimum balance in terms of energy conservation, environmental poisoning and human convenience.	Sc., S.S., H., M.

Global Objective B: When faced with decisions concerning the use of earth resources, the student will select practices developed in recognition of present and future environmental needs.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information, the student will:	Suggested Curriculum Areas
K-3	1.	describe and diagram his own community, showing where water and food is obtained and wastes (solid and liquid) are disposed.	S.S., H.
K-3	2.	list the observations made with his five senses while walking through the neighborhood, a woods, etc.	S.S., L.A.
K-3	3.	distinguish between the needs and luxuries of a family by classifying pictures into these groups.	S.S., L.A.
K-3	4.	indicate when various foods are shipped into his area by placing a W (Winter) and/or S (Summer) by pictures of the foods or their names in a listing.	S.S., L.A.
K-3	5.	construct a scrapbook or other device which illustrates the needs of man--clothing, food, fuel, shelter and their plant, animal or mineral source.	S.S., L.A.
K-3	6.	name examples of how needs and luxuries both use up natural resources and cause pollution.	Sc., S.S.
K-3	7.	classify environmental changes from before-	S.S., Sc.

		after picture sets as natural or man-caused.	
K-3	8.	label rings on a stump or log cross-section which came into being at the same time as various events in his or his family's life.	S.S., M.
K-3	9.	identify uses man makes of trees or other plants (food, shade, lumber, paper, bows, arrows, furniture, etc.).	S.S., Sc.
K-3	10.	record by pictures or stories the appearance of a tree or bush at the various seasons of the year and write a poem or story describing the change.	L.A., A.
K-3	11.	present a program dramatizing why forest fires should be prevented and how to prevent them.	L.A., S.S.
K-3	12.	record wildlife he has seen during a given time period noting the animal, date, time and location.	L.S., Sc.
K-3	13.	locate safe and unsafe drinking water supplies in his community.	Sc., S.S.
K-3	14.	name ways he can improve his surroundings.	L.A., H., S.S.
K-3	15.	record for one day pleasant and unpleasant sights he observes.	L.A., H.
K-3	16.	name three pleasant and unpleasant odors and identify their source.	L.A., Sc., H.
K-3	17.	identify places where there is a lack of air (plastic	L.A., H.

		bags, trunks, sand banks, etc.).	
K-3	18.	list words that tell about the conditions of the air and write a poem or story using these words.	L.A., H.
K-3	19.	list ways he uses water in his daily living.	L.A., S.S.
K-3	20.	construct a rain gauge and record amount of rainfall.	Sc., M.
K-3	21.	describe or illustrate the path of a stream he has observed and discuss changes in its character along its path.	Sc., H., L.A.
K-3	22.	use the oral or written word or the dramatic art to portray his dependence on clean water.	L.A., H., Sc.
K-3	23.	describe or illustrate how land is used in his community.	Sc., S.S.
K-3	24.	identify areas where erosion is in evidence.	Sc., S.S.
K-3	25.	examine a cubic foot of earth, list, and report his findings to the class.	Sc., L.A., M.
K-3	26.	plant similar seeds in different kinds of soil and record the difference in their growth when given similar amounts of water and sunshine.	Sc., M.
K-3.	27.	plant and cultivate a flower or vegetable garden at home or school and identify ways he controlled the environment to produce his desired ends.	Sc., S.S.
4-6	28.	rank modes of transportation according to impact	L.A., S.S., H.

		on resources using modes such as wagon, airplane, foot, car and train.	
4-6	29.	locate resources in his neighborhood, community and county which are undergoing change.	Sc., S.S., H.
4-6	30.	name resources which he uses and classify those which are renewable and those upon which he is dependent for his basic needs.	Sc., S.S.
4-6	31.	name and classify individuals upon whom he is dependent for his basic needs.	Sc., S.S.
4-6	32.	identify problems involving soil, water, air and plant life in his community and suggest and defend possible solutions to the problems.	Sc., S.S., H.
4-6	33.	illustrate that resources such as iron, coal and minerals must be conserved.	Sc., S.S.
4-6	34.	give examples which demonstrate how depletion of one resource can increase demands for another.	Sc., S.S.
4-6	35.	explain how the uneven distribution of natural resources affects the citizens of various countries including the United States.	S.S.
4-6	36.	discuss the concept that the earth is a spaceship with limited resources and has a limited capacity for recycling.	Sc., S.S., H.
4-6	37.	suggest political, social, economic and industrial rea-	Sc., S.S., H.

		sons for proposing laws about use of natural resources.	
4-6	38.	develop a model to demonstrate how water can be recycled.	Sc., S.S., H.
4-6	39.	write an imaginative story about a drop of water's journey through the water cycle.	Sc., L.A., H.
4-6	40.	compute the volume of water falling on a specified area during a one-inch rainfall.	Sc., M.
4-6	41.	estimate the cost of water he uses per year if water costs 10¢ per gallon.	M.
4-6	42.	explain how large bodies of water affect the climate in his locality and discuss how climate affects human behavior.	Sc., S.S., L.A.
4-6	43.	design a dramatic production to illustrate the dependence of plants and animals upon water as a resource.	Sc., L.A., C.A.
4-6	44.	cite examples illustrating how water management and conservation practices have affected the usefulness of land.	S.S.
4-6	45.	identify and map a local watershed.	Sc., S.S.
4-6	46.	identify community practices that will improve water quality downstream.	Sc., S.S., H.
4-6	47.	illustrate, using specific data, how delay increases the cost of cleaning up water.	S.S., H., M.
4-6	48.	defend or oppose the statement: "Environmental legisla-	Sc., S.S., H., L.A.

		tion and enforcement are necessary to preserve the quality of the oceans."	
4-6	49.	collect data on the percentage of the world's oxygen supply provided by the oceans and identify the key organisms in this cycle.	Sc., H.
4-6	50.	collect data, photographic records, etc., which provide evidence of the sources of air pollution.	Sc., H.
4-6	51.	give examples of naturally occurring air pollution.	Sc., H.
4-6	52.	collect evidence of air pollution causing deterioration of cement, etc.	Sc., H.
4-6	53.	explain how air is a reusable resource by indicating ways it is cleansed by nature, and to a limited degree by man.	Sc., H.
4-6	54.	propose an experiment which demonstrates air is an essential natural resource.	Sc., H.
4-6	55.	evaluate man's attempts to control air pollution by legislation.	S.S., H.
4-6	56.	volunteer to research how man, plants and machines use air and report this to class.	L.A., H.
4-6	57.	explain how heat and light reaching the earth are affected by air quality and influences his life.	L.A., H., Sc.
4-6	58.	describe the personal and financial commitments a per-	S.S., H.

		son must make in order to have clean air to breathe.	
4-6	59.	design an audiovisual presentation which depicts air quality as "everyone's" responsibility.	Sc., S.S., L.A., H.
4-6	60.	explain why trees are renewable resources.	Sc., S.S.
4-6	61.	identify and explain important functions of a plant or tree.	Sc.
4-6	62.	use local examples to describe or demonstrate how plants and trees control soil erosion.	Sc., S.S.
4-6	63.	collect and report data demonstrating the results of overgrazing, insects, forest fires and improper management on forests.	Sc., S.S., L.A.
4-6	64.	develop a report which compares short-term gains and long-range effects of various forest management programs.	Sc., S.S., L.A., C.A.
4-6	65.	suggest options open to society which will assure a future supply of forest products (i.e., recycling paper, optional building materials, optional resources for cellulose, tree farming, etc.)	Sc., S.S.
4-6	66.	describe in a report the role of the U.S. Forest Service, state government, industry or individuals in managing forests.	S.S., Sc., L.A.
4-6	67.	suggest ways of increasing the recreational values of a forest.	S.S., H., Sc.

4-6	68.	discuss how wildlife is a usable resource.	S.S.
4-6	69.	debate the resolution: "Man can survive without most forms of wildlife."	S.S., L.A., H.
4-6	70.	relate man's activities to various species becoming endangered or extinct.	S.S., Sc., H., L.A.
4-6	71.	list and discuss legislation affecting wildlife management.	Sc., S.S.
4-6	72.	select two communities and compare natural resource usage.	L.A., S.S., H.
4-6	73.	trace three products back to their origin to illustrate man's total dependence on soil.	S.S., Sc.
4-6	74.	write a story or drama to depict the changes that would occur in a community following the damming of a stream flowing through it.	S.S., Sc., H., L.A., C.A.
4-6	75.	give examples of how irrigation has brought unproductive land into useful production.	Sc., S.S.
4-6	76.	map location of essential mineral reserves throughout the world.	S.S., L.A.
4-6	77.	construct a chart or graph showing how advances in technology will increase mineral use.	S.S., Sc., M.
4-6	78.	construct charts and graphs which compare the use of minerals and fuels from 1900 until the present.	Sc., S.S.
7-9	79.	compute the land area of the world in square miles and acres.	S.S., L.A.

7-9	80.	calculate the area of the earth which is compatible to man's survival.	S.S., M., Sc.
7-9	81.	calculate the amount of corn that could be grown on acres covered by highways.	S.S., V.A., M.
7-9	82.	explain the economic and ecological advantages of using an organic garden.	Sc., V.A.
7-9	83.	discuss the implications of the data provided by charts and graphs which compare the use of minerals and fuels from 1900 until the present.	S.S.
7-9	84.	debate the resolution: "The coal industry has an obligation to reclaim the earth's surface it disturbs."	S.S., Sc., L.A.
7-9	85.	collect information about the changes of wildlife distribution in his community during the past 10 to 20 years and develop a public presentation on the topic.	L.A., V.A., Sc.
7-9	86.	write a theme or prepare a speech about wildlife habitat management.	V.A., L.A., Sc.
7-9	87.	plan and implement projects to attract acceptable forms of wildlife to the school grounds.	V.A., Sc., L.A.
7-9	88.	design and utilize methods for observing and recording wildlife habits without disturbing its activities.	V.A., Sc.
7-9	89.	prepare a community wildlife improvement plan.	V.A., Sc., S.S.

		which has a potential of being implemented.	
7-9	90.	discuss the need for preserving natural areas and related legislative needs.	Sc., S.S.
7-9	91.	debate the resolution: "Resolved man does not need the great blue heron, timber wolf, killer whale, or other wildlife."	L.A., S.S., Sc., H.
7-9	92.	debate the advisability of pet ownership by city dwellers.	S.S., Sc., H., L.A.
7-9	93.	prepare a world wildlife summary and present findings to the class or other groups.	Sc., S.S., L.A., M.
7-9	94.	use data concerning road, industrial and housing construction to estimate how long adequate wildlife habitat, watersheds, recreation areas or good farmland will remain.	S.S., Sc., M.
7-9	95.	discuss the use of hunting seasons to manage wildlife.	S.S., Sc.
7-9	96.	gather data and prepare a presentation on endangered species.	S.S., Sc., L.A.
7-9	97.	take a stand on "clear-cutting" forests and provide evidence to convince classmates and/or citizens of his position.	S.S., Sc.
7-9	98.	construct maps which identify areas of the earth having an annual rainfall of less than 10 inches and having an annual temperature of less than 50 degrees F.	S.S., Sc.

7-9	99.	illustrate the hydrologic cycle and how man has affected it.	Sc., S.S.
7-9	100.	demonstrate and project in a formal speech ways life patterns are formed by the distribution of water supply.	L.A., S.S., H.
7-9	101.	identify ways, both public and private, for reducing consumption of potable water.	S.S., H., Sc.
7-9	102.	identify ways to improve water management in his school.	S.S., H.
7-9	103.	list soil and water use practices which affect the rate of river bank erosion.	V.A., S.S., Sc.
7-9	104.	calculate the amount of water required to produce various products, both manufactured and natural, including food.	V.A., M., Sc.
7-9	105.	evaluate the effects of forms of water quality on man's environment in different periods of history after reading such writings as Longfellow's Evangeline, Parts II and III, and Heyerdahl's Ra Expedition, etc.	L.A., Sc., S.S.
7-9	106.	debate the proposition: "Local water quality is adequate for the local needs."	L.A., Sc., H.
7-9	107.	relate, in an imaginative story, what would happen if a supply of clean water were no longer available.	L.A., S.S., H., Sc.
7-9	108.	select a newspaper article, poem, story or original writing which emphasizes	L.A.

		man's or animal's needs for pure water.	
7-9	109.	explain why the bottled water business is becoming a profitable enterprise in California.	B., S.S., H.
7-9	110.	explain how water pollution by industrial chemicals in other states and nations affects life in Indiana.	S.S., H., Sc.
7-9	111.	collect data which shows the effects of pesticides, insecticides, poisonous chemicals, oil, untreated sewage, fertilizers, etc. on man's life.	S.S., Sc., H., M.
7-9	112.	identify possible untapped water sources and discuss the feasibility of using each.	S.S., H., Sc.
7-9	113.	use various media to report on air quality in his community.	L.A., Sc., M.
7-9	114.	distinguish fact from opinion about air quality expressed in newspaper articles and other media.	L.A., Sc.
7-9	115.	use various media to present a plan for improving the air quality of his community.	L.A., H., Sc., S.S.
7-9	116.	report on air quality in the 19th and 20th centuries. (Read Dickens' A Christmas Carol, "Marley's Ghost", etc.)	L.A., Sc., C.A.
7-9	117.	collect and analyze data on the history of air quality near population centers and relate findings to major changes in life styles such as the industrial revolution.	S.S., Sc., M., H.

7-9	118.	evaluate Indiana's efforts to improve air quality.	S.S., H.
7-9	119.	design materials showing the amount of gasoline, paper, meat, milk, bottles, cans, automobiles, water or clothing used by Americans in a year.	L.A., B., M., C.A.
7-9	120.	compare the environmental impact of a native American or pioneer to the impact of a modern American.	H., B., V.A., S.S.
7-9	121.	analyze common life styles in terms of basic needs and human convenience.	L.A., S.S., B.
7-9	122.	analyze the present styles of living in terms of the Earth's limited resources.	S.S., H., B.
7-9	123.	evaluate current advertising practices in terms of their potential environmental impact.	L.A., H., B., Sc., S.S.
7-9	124.	project the earth's resource depletion rate if all people consumed natural resources at the rate Americans do.	S.S., H., B., Sc.
7-9	125.	develop a presentation describing the action Americans must take to insure adequate resources for future generations.	S.S., Sc., L.A., C.A.
7-9	126.	identify four individuals who have worked diligently to improve the environment and express his appreciation of their efforts by writing or visiting them.	S.S., L.A.
7-9	127.	identify several organizations responsible for improving the environment and	V.A., S.S.

		explain the role each is playing in solving environmental problems.	
7-9	128.	design materials to show how smog develops in a major metropolitan area such as Gary or Indianapolis.	S.S., Sc., C.A., H.
10-12	129.		
	A.	collect and evaluate supply and demand data on local-, state-, national- or world-projected demand of two or more non-renewable resources and predict the zero supply date for each.	Sc., M., B.
10-12	B.	propose methods for delaying the zero supply date of a non-renewable resource and analyze the effects of his proposals on the environment and life styles.	Sc., S.S., B.
10-12	C.	select a plan to delay zero supply dates and design a program to communicate the need for action.	Sc., L.A., S.S., C.A.
10-12	D.	analyze the environmental impact of utilizing one or more natural or man-made substitutes for a non-renewable resource, considering supply, energy needed to secure and process it, and its potential as a pollutant.	Sc., M., B.
10-12	130.		
	A.	secure and evaluate data on the local, state, national and/or world supply of renewable resources, their	Sc., S.S., B.

		current depletion rate (in terms of both quantity and quality) and the demands of society on the products of these resources and determine the various mechanisms that affect the depletion of one or more of these resources.	
10-12	B.	propose methods for arresting and, if possible, reversing the depletion rate of a renewable resource to provide an optimal steady state supply of the resource and analyze the effects of his proposals on the environment and life styles.	Sc., S.S., M., B.
10-12	C.	design a program for communicating the need for action to arrest and/or reverse the depletion rate of a renewable earth resource.	Sc., L.A., S.S., C.A.
10-12	131.	define the role which science and technology can and should play in developing and implementing solutions to an earth resource problem.	Sc., B., S.S.
10-12	132.	name five ways Indiana rivers are being misused and propose a plan which would alleviate each problem.	S.S., H., Sc.
10-12	133.	locate areas on an Indiana map having primary, secondary and tertiary sewage treatment plants.	S.S., H., Sc.
10-12	134.	defend or oppose a plan to construct a man-made canal through Indiana to connect the Great Lakes with the Ohio River.	B., S.S., H.
10-12	135.	predict the future of game fish in Lake Michigan.	Sc., H., B.

10-12	136.	construct a world map showing major water pollution centers (rivers, lakes, oceans) and sources and discuss their probable permanence.	S.S., H., Sc.
10-12	137.	determine and compare per-capita consumption of various societies.	S.S., H., M., B.
10-12	138.	conduct research to determine far-reaching effects of pollutants dumped into nearby streams and lakes and report this information to class and community.	S.S., H., Sc.
10-12	139.	present his views concerning the economic and ecological implications of using algae from the ocean as food supplement.	H. Ec., Sc.,
10-12	140.	research and report the economic and ecological feasibility of using desalted ocean water for purposes of irrigation and human consumption.	Sc., B., S.S., H.
10-12	141.	determine the percentage of naturally recycled oxygen resulting from the oceans, identify the organisms involved, describe the effect of pollution on these organisms and propose a model regulatory system for coping with these problems.	Sc., S.S., H.
10-12	142.	plan and conduct a mass media presentation dealing with water and/or air quality.	L.A., Sc., S.S., H., C.A., B.
10-12	143.	design and/or participate in a school site management plan.	V.A., Sc., C.A.
10-12	144.	develop a farm land use and management model that will	V.A., S.S., Sc.

		maximize this land's potential service to present and future generations.	
10-12	145.	identify and explain problems resulting from intensified food production.	V.A., H., Sc.
10-12	146.	review how Steinbeck's Grapes of Wrath identifies the effect of man's manipulation of the land.	L.A., S.S., Sc.
10-12	147.	discuss the effects of water wildlife management using as examples the brown pelican, sword fish, killer whale, etc.	S.S., Sc.
10-12	148.	prepare a report on annual activities dealing with wildlife management in which he and the school could participate.	L.A., Sc.
10-12	149.	investigate and report on possible environmental careers.	Sc., H., S.S.
10-12	150.	become actively involved in a civic environmental problem that is immediate and relevant and make periodic reports on progress to the class.	L.A., S.S.
10-12	151.	analyze the impact the news media has on public views of environmental issues.	L.A., S.S., B.
10-12	152.	debate the resolution: "The United States cannot afford to build smaller cars, produce less clothing, construct fewer highways, etc."	B., S.S., L.A., H.

Global Objective C: The student will voluntarily participate in programs involving resource reclamation.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information, the student will:	Suggested Curriculum Areas
K-3	1.	identify and give examples of items which should be used more than once.	S.S., Sc.
K-3	2.	identify areas in his local community where wastes are treated, handled or dumped.	S.S., Sc.
K-3	3.	compare space taken by two emptied cans when one is flattened and one is not.	Sc., L.A.
K-3	4.	propose a better use for cans than throwing them in the garbage.	Sc., S.S.
K-3	5.	tell how his family recycles wastes.	Sc., H., S.S
K-3	6.	collect all the litter found on the school grounds in a day and estimate the amount of litter produced per student in the school.	M., Sc.
K-3	7.	organize a program to encourage others to help prevent the school grounds from becoming littered.	Sc., C.A., L.A., S.S., H.
K-3	8.	plan and participate in collection campaigns which will help in the recycling of waste materials.	Sc., S.S.
K-3	9.	classify litter collected around the school (or in the neighborhood) into various	Sc.

		groups: natural or man-made, designed as a container or non-container, plastic or non-plastic, etc.	
4-6	10.	identify items he uses which may be recycled.	Sc., S.S.
4-6	11.	identify some specific, near-by locations in his community where recyclable materials may be taken for processing.	Sc., S.S.
4-6	12.	suggest possible methods of recycling for his community which would be both practical and suitable for maintaining a high quality of life.	Sc., S.S., H.
4-6	13.	prepare a presentation about the amount of materials produced in the school or community.	L.A., C.A.
4-6	14.	defend the recycling of paper, metals, plastics, etc., using data regarding the depletion of that particular resource or raw materials.	S.S., Sc.
4-6	15.	ask five families if they would be willing to recycle their solid wastes and report findings of survey to class.	L.A., S.S.
4-6	16.	identify materials he uses daily and trace them to minerals used in making the product.	S.S., Sc.
4-6	17.	use various media to depict how waste disposal is related to environmental quality.	Sc., S.S., H., L.A., C.A
4-6	18.	predict the effects of paper recycling programs on forests.	S.S., Sc.

4-6	19.	plan a presentation encouraging his solutions to pollution problems.	L.A., H., S.S
7-9	20.	give three examples of how man wastes minerals in his daily living habits and propose a better use plan for each.	S.S., Sc., B
7-9	21.	predict the effects of not recycling minerals in terms of future costs and availability.	S.S., M., B.
7-9	22.	calculate the tons of recyclable materials produced in the United States in a year.	S.S., M., B.
7-9	23.	use current data on use of minerals to project future reserves and examine how mass recycling would change this projection.	S.S., M., B.
7-9	24.	debate the resolution: "Each American family should be restricted to one car."	S.S., B., Sc., L.A.
7-9	25.	debate the resolution: "Non-returnable bottles and aluminum cans should not be allowed in school buildings."	S.S., Sc., L.A., B.
7-9	26.	identify materials which can be recycled and propose a plan to accomplish maximum recycling in his community.	S.S., Sc.
7-9	27.	plan and publicize a recycling project.	L.A., C.A., S.S., Sc.
7-9	28.	list practices in his home which waste resources and propose better practices.	S.S., Sc., H. Ec., H., B.
7-9	29.	evaluate existing recycling programs in his community.	S.S., Sc., H.

C - Resource Reclamation

7-9	30.	analyze the effect of various waste disposal systems on the environment and state the conditions which would make each system advisable.	Sc., H., S.S.
7-9	31.	debate the resolution: "Business and industry are currently fulfilling their responsibility in the management of non-renewable resources."	S.S., L.A., Sc., H., B.
7-9	32.	discuss the adequacy of existing solid waste laws.	S.S., Sc.
7-9	33.	develop a state non-renewable resource management model.	S.S., Sc., B.
7-9	34.	discuss the adequacy of federal and state budgeting for the development of solid waste recycling.	S.S., Sc.
7-9	35.	discuss the relation between a nation's waste burden and its level of civilization.	S.S., L.A.
10-12	36.		
	A.	compile enough information to classify human, industrial and business wastes into one or more of the following categories: returnable and reusable in form, a reclaimable by-product, recyclable by technology (i.e., would require small energy input), recyclable with great energy consumption or practically non-recyclable.	Sc., S.S., B
10-12	B.	classify non-recyclable and expensively recyclable wastes as essential by-products of human life or by-products of human convenience.	Sc., S.S., B.

C - Resource Reclamation

10-12	C.	assess the environmental impact of the accumulation of wastes not easily recyclable, but essential by-products of human life, on the continuing evolutionary processes of the earth and propose optimal methods for the management of these wastes.	S.S., Sc., H.
10-12	D.	use his data to propose viable programs for minimizing the accumulation of man-generated wastes in the air, water and soil and analyze the effects of such programs on life styles including his own.	Sc., S.S., B.
10-12	E.	design a program to effectively communicate the need and feasibility of recommended action for an acceptable waste management program.	L.A., S.S., Sc., H., C.A., B.
10-12	37.	collect the needed information on two or more current or proposed methods of waste disposal and compare their potential environmental impact in terms of harboring pests and disease and/or poisoning various life forms (e.g. landfills vs. open dump, septic tank vs. secondary treatment).	Sc., S.S., H.
10-12	38.	illustrate how changing "life styles" may prevent a world catastrophe.	S.S., B., Sc., L.A.
10-12	39.	evaluate the following waste management proposals:	S.S., H., H. Ec., L.A., Sc.
	A.	"ship solid waste to abandoned mines to be stockpiled for future use."	
	B.	"compress trash into building bricks."	

	C.	"mulch solid waste for use as fertilizer."	
	D.	"simplify and/or reduce packaging of solid products."	
	E.	"use reusable packaging for all liquid products."	
10-12	40.	document the extent of open dumping in his community and discuss its impact on community pride.	S.S., L.A., Sc., C.A.
10-12	41.	collect data on ocean dumping and its potential hazard to the human species.	S.S., Sc., H.
10-12	42.	review current federal, state or local legislation dealing with solid waste disposal and examine its strengths and inadequacies.	H., S.S., Sc.
10-12	43.	plan a community recycling project of as many items as he determines to be practical.	S.S., H., L.A., Sc.
10-12	44.	plan an organic gardening project for his home, school or community which demonstrates the value of recycling organic wastes.	S.S., V.A., H. Ec.
10-12	45.	construct a model of a typical septic system, describe the function of each part and/or discuss its adequacy as a treatment system.	H., Sc.
10-12	46.	investigate the possibility of installing a "Lagoon System" in his community and report his findings to the school and community.	H., Sc., S.S., L.A.
10-12	47.	calculate the cost per family of various types of sewage	H., M., Sc., B.

		treatment systems and compare their effectiveness.	
10-12	48.	demonstrate the effect of thermal pollution on algae growth and its effect on other life in the water.	H., Sc., B.
10-12	49.	determine techniques for locating sources of water pollution.	H., Sc., B.
10-12	50.	identify polluters of water in his area and describe steps that he, as a private citizen, can take in an attempt to correct each problem.	H., S.S., Sc., B.
10-12	51.	identify diseases which may result from the drinking of polluted water.	H., Sc.
10-12	52.	develop a workable plan for recycling water which would be appropriate for his particular community.	H., Sc., S.S.

Global Objective D: The student will demonstrate his awareness of population processes and dynamics by rationally defending a position on population management.*

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information, the student will:	Suggested Curriculum Areas
K-3	1.	explain his feelings about overcrowded conditions after two classes have shared a classroom for a period of time.	S.S., Sc.
K-3	2.	list places he can play and compare them to places he would like to play.	S.S.
K-3	3.	make observations of a closed terrarium or aquarium and record by pictures the changes in population which occur throughout the year.	Sc., C.A.
K-3	4.	observe and record changes in the outdoor populations which occur as the seasons change.	Sc., M.
K-3	5.	compare the number of people who live in a single building in the city with people per building in the country (after a trip to the country or city).	S.S., M.
K-3	6.	compare the play of city children with the play of country children (after a trip to the city or country).	S.S.
K-3	7.	compare the size of his family with the families of others in his classroom.	S.S., M.

* See definition of Population Education on Page 81.

D - Population Processes and Dynamics

4-6	8.	compare available space per person today with the space that was available in the year 1900.	S.S., Sc., M.
4-6	9.	compare the ease with which various human wants and needs can be met in urban and rural environments.	S.S., H., Sc., L.A.
4-6	10.	identify some effects that food, disease, birth rate and land use have upon life expectancy.	S.S., H., Sc.
4-6	11.	compare the roads of long ago with modern day roads, showing change in use due to population growth.	S.S., L.A.
4-6	12.	construct a food web for an eco-community he has observed.	Sc., S.S.
4-6	13.		
	A.	establish a balanced aquarium either at school or at home.	Sc., S.S.
4-6	B.	identify population variables which, if manipulated, would have an effect on the aquarium environment.	Sc.
4-6	C.	suggest changes which would occur in the aquarium for each of the variables listed above.	Sc.
4-6	D.	test the effect of each variable on the aquarium environment and record observable changes.	Sc.
4-6	E.	relate the changes that occurred in the aquarium to their causes.	Sc., L.A., C.A.

4-6	14.	choose something that has changed since pioneers came to Indiana and relate these changes to increased population.	S.S., L.A.
4-6	15.	illustrate how a population concentration can affect the pleasures coming from a leisure-time activity (Camping, hiking, sports, nature study, etc.).	S.S., L.A., H., C.A.
4-6	16.	illustrate how the population of either plants, animals or humans with a given area affect the quality of life of each organism.	S.S., L.A., H., Sc.
4-6	17.	investigate fish sizes in various lakes, aquariums, etc.-, and relate to population concentrations.	L.A., H., Sc.
4-6	18.	debate the issue: Deer hunting is necessary to maintain a balance in wildlife areas.	S.S., L.A.
4-6	19.	list ways overcrowded classrooms affect learning (poor air, noise, room for walking, etc.) and suggest how such problems might be overcome.	S.S., L.A., H., Sc.
4-6	20	construct a model which demonstrates an ecological balance among plants and animals.	S.S., Sc., C.A.
7-9	21.		
	A.	use media to show environmental changes resulting from overpopulation.	S.S., L.A., Sc., C.A.
7-9	B.	defend assumptions used in a presentation on overpopulation.	S.S., L.A., H., Sc.

7-9	22.	relate population growth and man's use of energy and resources to some of today's more serious environmental problems.	S.S., H., Sc. L.A.
7-9	23.	gather and interpret data demonstrating the geometric increase of population and the arithmetic increase of food production and discuss implications.	S.S., M., Sc., L.A.
7-9	24.	relate overcrowding to health problems.	S.S., H., Sc., L.A.
7-9	25.	use rational argument to debate the topic: Population controls should be set by the government.	S.S., H., Sc., L.A.
7-9	26.	debate the proposition: The government should compensate women for each five years they remain childless between ages 14-49.	S.S., L.A., Ec.
7-9	27.	predict the changes that would take place in his family life if his mother gave birth to triplets.	S.S., H., L.A., C.A.
7-9	28.	list and describe four practices cities should follow to cope with crowding problems.	C.A., H., Sc.
7-9	29.	compare the merits of high-rise apartments with those of single-family dwellings in terms of quality of life and environmental impact.	S.S., H., Sc.
7-9	30.	discuss the psychological and physical effects resulting from crowding in large cities and identify what can be done to solve some of these problems.	S.S., H., Sc., Psy., B.

D - Population Processes and Dynamics

7-9	31.	demonstrate, using written or oral communication, how population size affects the accuracy of information transfer.	S.S., L.A.
7-9	32.	infer from graphed data on world population growth for the past 20 centuries some resulting social and economic problems.	S.S., H., M., B., Sc.
7-9	33.	graph the change in population concentrations per square mile for his area during the past 50 years and discuss the implications if these trends continue.	S.S., M., Sc.
7-9	34.		
	A.	graph the population of the earth at the beginning of each century, zero A.D. to the present.	S.S., Sc., H.
7-9	B.	extrapolate from current world population growth data the expected world populations for the year 2000 and 2500 and use this information to predict the future needs of his area.	S.S., H., M., Sc.
7-9	C.	prepare a report which evaluates present farming methods and project changes necessary to meet the needs of various predicted world populations.	S.S., V.A., H., L.A.
7-9	D.	defend land-use planning in terms of meeting future needs for all aspects of human existence.	S.S., Sc., H., L.A., Psy.
7-9	E.	role play different national leaders solving predicted food problems.	S.S., V.A., H., Sc., L.A., C.A.

7-9	35.	calculate the acres removed from food production by urbanization.	S.S., V.A., M.
7-9	36.		
	A.	use data to compare population growth rates of underdeveloped, developing and developed countries.	S.S., M.
	B.	list and discuss societal, cultural and family values which may account for differences observed above.	V.A., S.S., L.A., H. Ec.
7-9	C.	analyze pressures upon government agencies in each of the national categories above when attempts are made to manage population growth.	S.S., L.A., S.
7-9	D.	predict future action countries may have to take to feed, clothe and house their people.	S.S., V.A., Sc.
7-9	37.	predict the effects a 2 per cent increase in world population would have on resources and ecosystems.	S.S., H., Sc., M.
7-9	38.	analyze the effect of an increasing population on wildlife.	S.S., Sc.
7-9	39.	use various media to demonstrate changes which would occur in nature if America's population were doubled.	L.A., Sc.
7-9	40.	debate the topic: "Resolved that population growth makes solution of other environmental problems futile."	S.S., H., Sc., L.A.
7-9	41.	discuss the feasibility of solving the earth's popula-	S.S., H., Sc.

		tion problems by space migration.	
7-9	42.	indicate how his experiences in the study of population has affected his attitudes.	S.S., Psy., L.A.
10-12	43.	debate the following statements:	S.S., H., Sc., Psy., B., L.A.
	A.	"Resolved that in order to control population, welfare recipients should not receive allowances for child support."	
	B.	"Resolved that money spent on war and space exploration could be better spent on solving population and pollution problems."	
	C.	"Resolved that oceanic space, food and mineral resources can be used to support a doubled world population."	
	D.	"Resolved that increasing the industrial capability of a community will improve the quality of life of its citizens."	
	E.	"Resolved that the tax structure should be altered to penalize large families."	
10-12	44.	evaluate the following proposals:	S.S., H., Sc.,
	A.	"Families must limit themselves to two children."	L.A.
	B.	"The United States should insist on population control measures as a prerequisite for food aid to foreign countries."	

	C.	"The federal government should fund research on birth control."	
	D.	"The United Nations should develop programs to meet the needs of the world's current population growth."	
	E.	"Family planning centers should be developed in all communities."	
10-12	45.	investigate population growth in his own community by collecting and computing birth and death rate data.	S.S., M.
10-12	46.		
	A.	participate in a mock trial in which one or more persons is accused of violating Zero Population Growth requirements in the year 1984.	L.A., S.S.
	B.	stage a 1984 mock United Nations hearing in which one or more nations has been called into question for failing to implement Zero Population Growth.	S.S., Sc., C.A.
10-12	C.	debate the position: "Controlled birth and death is the only way to control population."	S.S., H., L.A.
10-12	47.	predict, based on population for the years 1850 to the present, when this planet will likely have more people than its resources can feed, clothe and shelter.	S.S., H., M., Sc.,
10-12	48.		
	A.	secure and evaluate data (both historical and current) on population trends of his community, county, state, nation and/or world.	Sc., S.S.
	B.	secure and analyze data on the impact of population con-	Sc., S.S.

		centration on life styles.	
	C.	use the data analyzed above to develop and defend a position on the need to regulate population.	S.S., Sc., L.A.
10-12	D.	calculate how long it will take to establish ZPG and what this stablized population will be if a program to limit women to two children is immediately implemented.	Sc., M.
	E.	evaluate various mechanisms in terms of effectivenss, usability and moral acceptability.	Sc., S.S.
	F.	discuss the impact of a forced ZPG on his life style and value system.	H., S.S., L.A., B.
	G.	develop a plan to communicate his findings and conclusions to various groups.	L.A., S.S., C.A.
	H.	project the effect that an increasing worldwide life expectancy of 10 years would have on a stabilized population level if population control mechanisms were to remain static.	M., Sc., S.S.
10-12	49.	discuss whether advancements in medical science have been a blessing to mankind.	S.S., L.A.
	50.	identify at least six environmental problems related to overpopulation and explain these relationships.	S.S., H., Sc., L.A.
10-12	51.		
	A.	use various media to depict the confrontations that would take place on a long-term spaceship voyage if the passengers did not observe ZPG policies.	L.A., Sc., S.S., H., C.A.
	B.	relate these projected confrontations to the future of the Spaceship Earth.	S.S., L.A., Sc.

10-12	52.	relate revolutionary activity and political unrest to crowding and validate his inferred relationships by reviewing the history of armed conflict.	S.S., Psy.
10-12	53.	assume a future world population of 7 billion in the year 2000 and depict the effect of this population on the quality of life.	S.S., L.A., H., M.
10-12	54.	extrapolate population and food production data to the point where the demand for food in this country and/or world will equal the supply.	S.S., V.A., Sc., M.
10-12	55.		
	A.	suggest reasons why the rate of population growth in India remained unchanged even though 1.6 million men submitted to sterilization in a single year.	S.S., H., M.
10-12	B.	identify and explain new problems India may have by 1980.	S.S., V.A., H. Sc.
	C.	prepare a report on the problems caused by population explosion in other Middle Eastern countries.	S.S., H., Sc., Psy., L.A.
10-12	56.	list and explain ways in which the United States population affects the resources of other countries.	S.S., H., Sc., Ec.
10-12	57.	use various media to illustrate how individual acts, duplicated or compounded, produce significant environmental alterations.	L.A., Sc., S.S.
10-12	58.	evaluate the possibility of mass migration to another planet to ease	M., Sc.

		the Earth's load by calculating the energy requirements for such migrations based on two or more rates of population growth.	
10-12	59.	investigate the family planning being considered by five young married couples in his community.	S.S., H.

What Is Population Education?

Population education is defined as the process by which the student investigates and explores the nature and meaning of population processes, population characteristics, the causes of population change and, most important, the consequences of these processes, characteristics and changes for himself, his family, his society and the world.

The goal of population education is to assist students to conceptualize the relevance of population for themselves, to assist them thereby to make rational and responsible individual and collective decisions about population matters, utilizing appropriate information and analytic skills. For the family, the goal can be stated as responsible fertility behavior; for the community, as rational and responsible decisions on population and public policy.

Population education is meant to educate, not to propagandize or indoctrinate. Population education views population not as a "problem" to be solved but as a "phenomenon" to be understood. The goal of understanding is to provide the intellectual underpinning for responsible action. Population education programs must also involve students in an exploration of their own values and attitudes.

Global Objective E: The student will demonstrate an appreciation for the interdependence of living things in the closed earth system.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information, the student will:	Suggested Curriculum Areas
K-3	1.	describe how people in his community are dependent upon other communities for food, clothing and shelter, e.g., grassland communities, oceanside communities, forest communities, etc.	Sc., S.S., H.
K-3	2.	describe ways in which man's presence in his community has produced changes from its original natural state (construction of roads, bridges, houses, businesses, factories, etc.).	Sc., S.S., H.
K-3	3.	compare air and/or soil temperatures recorded at the same time for classrooms, playground, lawn, flower beds, wood lots and explain why these temperatures are not the same.	Sc., M.
K-3	4.	correctly identify common plants found in his area that may be harmful to people such as poison ivy, poison oak, etc.	Sc.
K-3	5.	identify common plants found on the school playground and develop a key	Sc.

		to classify and identify them.	
K-3	6.	identify several animals on sight or from pictures.	Sc., L.A.
K-3	7.	deduct from a set of animal tracks (or picture of them) what the animal was, where it came from and what it might have done.	Sc.
K-3	8.	construct a terrarium.	Sc.
K-3	9.	report on the needs of an animal or bird of his choice.	L.A., Sc., C.A.
K-3	10.	develop and present an imaginative story telling what happened to him as a frog when he went out to dinner.	L.A., Sc., C.A.
K-3	11.	identify a number of birds or other small animals found in his area and describe their food and nesting requirements.	Sc., L.A.
K-3	12.	develop and execute a plan to improve bird and animal habitats such as building nesting boxes, establishing cover for rabbits, etc.	Sc., C.A.
K-3	13.	pretend to be a rabbit and explain where you would look for food, shelter and protection from enemies.	L.A., Sc., C.A.
K-3	14.	discuss the effects that burning weedy fields and fence rows have on the nesting grounds of birds	Sc.

		and small mammals (Pheasants, quail, rabbits, meadowlarks, etc.).	
K-3	15.	express in a creative play his feelings about man destroying the habitats of animals.	L.A., Sc.
K-3	16.	compare some food chains he has observed.	Sc., S.S.
K-3	17.	generate a story, play, etc., which would depict what life would be like if pigs and cows became extinct.	L.A., S.S., C.A.
K-3	18.	carry out a study to determine how homeless cats and dogs may be a problem in the community.	Sc., S.S., H.
K-3	19.	identify the necessities for life on a spaceship by drawing or cutting out pictures of the needed supplies.	Sc., L.A., S.S., C.A.
4-6	20.	identify some endangered species of animals and describe factors leading to their extinction.	Sc., S.S., H.
4-6	21.	depict in a class play a family living in harmony with the environment.	L.A., S.S., Sc.
4-6	22.	classify ecological processes occuring locally as beneficial or detrimental.	S.S., H., Sc.
4-6	23.	identify major categories of man's needs for support and maintenance of life.	Sc., S.S.
4-6	24. A.	record observations made about wildlife found in his	Sc., L.A.

		neighborhood during each season of the year.	
4-6	B.	prepare a report which contains observations and conclusions formed as a result of the study.	Sc., L.A.
4-6	25.	give examples of simple predator-prey relationships.	Sc., S.S.
4-6	26.	suggest possible results of disruption in predator-prey relationships.	Sc., S.S.
4-6	27.	construct a food chain of a given animal and describe the effect if this chain were to be broken.	Sc., L.A., S.S.
4-6	28.	name three wild animals commonly found in Indiana and list the major elements of a suitable habitat for each.	Sc., S.S.
4-6	29.	demonstrate two ways living things are interdependent.	Sc., S.S., H.
4-6	30.	predict the results of the addition of a new species to a balanced ecological system.	Sc., S.S.
4-6	31.	give examples of organisms which are harmful to man but are helpful in maintaining a balance between living things.	Sc., H., S.S.
4-6	32.	construct a chart showing green plants as the basic source of man's supplies for food, clothing, shelter and energy.	Sc., S.S., C.A.
4-6	33.	discuss why pesticides must often be used even though	S.S., H., Sc.

		they may be detrimental to many species of life.	
4-6	34.	develop an imaginative story of one day in the life of a plant or animal he has observed.	L.A., Sc.
4-6	35.	give examples of man preserving or destroying the earth's life support systems.	Sc., H., S.S.
4-6	36.	describe types of natural organic decomposition and identify ways that man's actions have disrupted these natural cycles.	Sc., S.S.
4-6	37.	construct food chains with man as the terminal consumer.	Sc., S.S.
4-6	38.	demonstrate how man is part of the ecosystem and must live within it.	Sc., S.S., H.
4-6	39.	formulate a model to illustrate the finite nature of the earth system.	Sc., C.A., S.S., H.
7-9	40.	support with data why the earth's resources, even with optimum recycling systems, can support only a limited population.	S.S., Sc., H.
7-9	41.	discuss why man must abandon his "use and move on" practices.	S.S., Sc., H.
7-9	42.		
	A.	give examples of how survival of an organism depends on its ability to adjust to its environment.	Sc., S.S., H.
	B.	explain how man makes the most of his adaptations through the use of his intelligence.	Sc., S.S.

7-9	43.	construct food webs which contain various specified animals such as fox, hawk, mouse, salmon, shark, cow, owl, man.	Sc., S.S.
7-9	44.	trace the journey of a particle of matter through a living organism from dust to dust.	Sc., S.S.
7-9	45.	develop and test a hypothesis about reducing the owl population in his county.	Sc., S.S.
7-9	46.	collect evidence showing how the "balance of nature' has become upset with the removal of a species from an eco-community.	Sc., S.S.
7-9	47.	illustrate how the carrying capacity of an area is determined by certain ecological factors.	Sc., S.S.
7-9	48.	construct various microhabitats and test their carrying capacity in terms of a given species.	
7-9	49.	evaluate the truth of the position: The interdependence of animals and plants provides a balance between living things on Earth and does not allow overpopulation.	Sc., S.S.
7-9	50.	diagram the interrelationships of animals and plants in his community and report how his daily activities affect this interdependency.	Sc., S.S., H.
7-9	51.	explain the complexities of an ecological problem within a given ecosystem.	Sc., S.S., H., L.A.

E - Interdependence

7-9	52.	identify an ecological problem in his community and design a program to correct it.	S.S., Sc., H.
7-9	53.	report on an overloaded system he has observed.	L.A., Sc., H.,
7-9	54.	formulate a hypothesis about how changed environmental practices may affect the ecological balance.	S.S., Sc., H.
7-9	55.	discuss how the manipulation of one environmental element affects all elements.	S.S., Sc., H.
7-9	56.	identify how the CO_2 - O_2 (carbon dioxide-oxygen) cycle is affected by his family, industry and citizens in the community and discuss what he and others can do to improve the CO_2 - O_2 cycle.	S.S., Sc., H.
7-9	57.	suggest ways to guard against detrimental environmental manipulations of ecosystems.	Sc., H., L.A., S.S.
7-9	58.	identify idustrial practices which minimze detrimental impacts on the environment.	S.S., Sc., H., I.A.
7-9	59.	gather, interpret and disseminate information concerning the effects of chemicals (pesticides, phosphates, etc.) on functioning ecosystems.	Sc., L.A., H., V.A.
7-9	60.	design an experiment to investigate the effect of detergents on fish.	Sc., H.

7-9	61.	collect data to illustrate the change in algae species that result from increased detergent use.	Sc., H., S.S.
7-9	62.	hypothesize about ecological problems resulting from the destruction of a marsh.	Sc., S.S., H.
7-9	63.	brainstorm and contribute to a list of ideas on the question: How can man live in harmony with nature in the 20th and/or 21st century?	L.A., S.S., Sc., H.
7-9	64.	construct a model of a watershed which shows how living organism interact with each other and their environment.	S.S., Sc., L.A., H., C.A.
7-9	65.	develop a satirical T.V. presentation highlighting the concept that an area can support only a limited number of organisms.	Sc., L.A., S.S., H., C.A.
7-9	66.		
	A.	develop a compost pile.	Sc., V.A., H.E.
	B.	observe and report on the natural processes occuring in a compost pile.	Sc., V.A., L.A.
	C.	relate composting to maintaining an environmental quality.	Sc., V.A., H. Ec.
7-9	67.	observe and describe the natural and ecological beauty of a pond and discuss life styles needed to preserve its delicate balance.	L.A., S.S., Sc., C.A.
7-9	68.	portray through media the natural and ecological beauty of a river and	L.A., S.S., Sc., C.A.

		discuss life styles needed to preserve its ecological function.	
7-9	69.		
	A.	construct an operational definition of a closed system after gathering data concerning the needs and limitations imposed on a spaceship crew during a trip to Mars.	Sc., H., S.S., L.A.
	B.	write and produce a drama which depicts an extended voyage through space in a closed spaceship system.	L.A., Sc., S.S. H., C.A.
	C.	describe plant-animal interdependence within a spaceship during a flight to a near star.	Sc. S.S., L.A., H.
10-12	70.	defend his reasons for advocating certain social and/or governmental controls which limits man's freedom in determining his own life style.	Sc., S.S.
10-12	71.	develop a documentary media presentation showing the dependence of all living things on pure water.	Sc., H., C.A., S.S.
10-12	72.	observe and report on the natural steps which occur in lakes, rivers, etc., to decompose waste.	Sc., H., C.A., S.S.
10-12	73.	provide ecological reasons why species of fish once in Lake Erie are no longer there.	Sc., H., S.S.
10-12	74.	collect data and chart changes of a local pond, lake or river over an extended period of time.	Sc., S.S., M.

10-12	75.	evaluate the environmental impacts that have resulted from the draining of marshes which once covered most of northern Indiana.	Sc., S.S., B., V.A.
10-12	76.	describe one cause and effect relationship which occurs as a result of man's attempt to exterminate predators.	Sc., L.A.
10-12	77.	debate the validity of the premise: "The history of man is the history of his growing mastery over nature."	Sc., L.A., S.S.
10-12	78.	discuss the hypothesis: "The biosphere, as it occurs on earth, is a single macro-organism."	Sc.
10-12	79.	draw, or describe, a food chain which shows how animals collect insecticides, pesticides, etc., in their bodies.	Sc., L.A., H., V.A.
10-12	80.	propose action to remove harmful insecticides and pesticides from the market.	Sc., V.A., H., B., S.S.
10-12	81.	report on research being done to prevent future products from being marketed until adequate testing data proves them safe.	Sc., S.S., B.
10-12	82.	offer alternatives to the use of insecticides for insect control.	Sc., V.A.
10-12	83.	predict the future of man if he continues to pollute the environment with pesticides.	Sc., H., V.A., S.S.
10-12	84.	select an article from a popular periodical (or news-	L.A., Sc., S.S.

		paper) dealing with environmental problems and analyze cause and effect relationships stated in it as to whether these relationships are observations, substantiated conclusions based on observations, supportable hypotheses or merely inferences of the author.	
10-12	85.	tape a radio or television program dealing with the environment and analyze cause and effect relationships presented in it as to ---(see above).	L.A., Sc., S.S.
10-12	86.		
	A.	select an isolated biological community and analyze it in terms of identifying all possible ecological relationships between individual organisms and species within it.	Sc.
	B.	analyze the above biological communities in terms of any natural ecological succession that is occurring within it.	Sc.
10-12	C.	further investigate this biological community to identify any imports and exports (including animal migration) of energy and matter occurring.	Sc.
	D.	impose a hypothetical change upon this biological community (such as a sudden change in the population or habits of one native species, temperature, rainfall or the introduction of foreign matter or species) and	Sc., S.S.

		trace the ecological disturbances that would occur in the community.	
10-12	E.	use the model developed in the four objectives above to formulate a model for the closed earth system.	Sc., S.S., H.
	F.	analyze and project the impact of various human activities upon the model earth system.	
	G.	use various communicative techniques and art forms to present ecological problems he has investigated in the six above objectives.	L.A., C.A., S.S., Sc.
10-12	87.		
	A.	select a specific natural resource available to another country (uranium ore in Mainland China, oil in the Middle East, caviar in Russia, sugar in Cuba, etc.) and discuss the various impacts of this supply on his life.	S.S.
	B.	discuss the political, economical, historical and cultural implications of the world distribution of various natural resources.	S.S., B., L.A.
	88.		
	A.	select a proposed local construction project and carry out the environmental impact study.	S.S., Sc.
	B.	secure a copy of an environmental impact study that has been substantiated to the Environmental Protection Agency or the Indiana Department of Natural Resources and evaluate its adequacy.	S.S., Sc.

Global Objective F: The student will examine optional courses of action and their consequences for improving the quality of life and will support those that will provide optimum short- and long-term benefits for himself, society and the environment.

Suggested Grade Level	Instructional Objectives: Provided with the necessary activities, experiences, data and information, the student will:	Suggested Curriculum Areas
K-3	1. demonstrate by group and individual action that his classmates' rights must be respected.	S.S.
K-3	2. show by his behavior that he respects private ownership.	S.S.
K-3	3. explain why he feels the basic needs of life should also include truth, beauty, justice, love and faith. (Give examples of how each person may contribute to each of the above.)	S.S., Sc.
K-3	4. give examples of situations in his home or community which provide comfort for various members of the family.	S.S., Sc.
K-3	5. differentiate between housing in his community which seems to be adequate and housing which is not.	S.S., Sc.
K-3	6. develop individual, class or "action" projects that will improve the community environment. Some suggestions include: anti-litter drives, using both sides of a piece of paper, a classroom flower	S.S., Sc., C.A., L.A.

		garden, picking up trash along the street, etc.	
K-3	7.	"plan" a community which provides for homes, work, food, water, waste disposal, etc., using a sand table, diagram, or bulletin board.	Sc., C.A., S.S., H.
K-3	8.	show, through dramatization by puppets, the results of careless planning of a classroom, school or community.	L.A., S.S., H., C.A.
K-3	9.	differentiate between good or bad land use from pictures or experiences.	L.A., S.S.
K-3	10.	suggest ways to better care for land in his community.	S.S., Sc., H.
K-3	11.	suggest reasons wildflowers should be preserved for others to enjoy.	C.A., S.S., Sc.
K-3	12.	list and discuss sounds which he likes or dislikes.	Sc., H., C.A.
4-6	13.	observe people in crowded situations and report how their behavior changes.	S.S., Sc., H.
4-6	14.	suggest ways local people may be influenced to more completely appreciate and protect their environment.	S.S., Sc.
4-6	15.	plan and promote ways to develop individual and community spirit in highly polluted areas.	S.S., H.
4-6	16.	demonstrate the difference between the needs of man and his wants that are not essential to life by dramatization, role playing, etc.	Sc., H., L.A., S.S., C.A.

4-6	17.	observe and identify types of pollution that affect the quality of life.	Sc., S.S., H.
4-6	18.	identify noise pollution sources in the school community.	S.S., H., Sc., C.A.
4-6	19.	group sounds from several locations as natural and man-made, pleasant or unpleasant.	Sc., H., C.A.
4-6	20.	discuss the results noise pollution may have on people if it is not controlled.	S.S., H., C.A.
4-6	21.	demonstrate ways noise interferes with learning ability.	Sc., S.S., H.
4-6	22.	design and demonstrate a system for measuring the intensity of sound.	Sc., H., C.A.
4-6	23.	propose feasible solutions to noise pollution problems in his community.	Sc., H., S.S.
4-6	24.	observe and describe the steps that are necessary to produce potable water at the faucet in his home.	Sc., S.S., H.
4-6	25.	give examples of how technology and proper management have restored land.	Sc., S.S.
4-6	26.	commend those responsible for improving environmental quality. (Techniques: poetry, letters, songs, stories, individual actions.)	L.A., C.A.

4-6	27.	describe how highways affect the use of land and discuss the aesthetic, economic and other effects of such changes.	L.A., S.S., Sc.
4-6	28.	develop a transportation plan for his community to alleviate many of its pollution and safety problems.	S.S., H.
4-6	29.	identify recreation areas in his community which may soon be unusable because of improper use, development, size or contamination.	H., Sc., S.S.
4-6	30.	identify local practices which affect the beauty of the community.	Sc., S.S., H.
4-6	31.	explain why he feels beauty and recreation are important in man's leisure-time activities.	S.S., H., Sc., C.A.
4-6	32.	develop a photographic essay to show how man has capitalized on nature's beauty.	L.A., C.A.
4-6	33.	give examples of steps which might be taken to prevent or minimize pollution by some of the following: self, family, neighborhood, industry, towns, cities, counties, states, federal government, United Nations, nations of the world.	Sc., S.S., H., B.
4-6	34.	list the uses and abuses of natural resources observed during a recent field trip.	L.A., H., Sc., S.S.

4-6	35.	survey the community to determine attitudes of individuals, farmers, businessmen or others about pollution control.	S.S., H., Sc., B.
4-6	36.	discuss reasons why laws have been established to reduce pollution, protect wildlife, protect flowers, etc.	S.S., H., Sc.
4-6	37.	discuss whether new laws, a concerned citizenry and new technology will enable man to maintain a livable environment.	H., S.S., Sc., B.
4-6	38.	write a dialog or play to illustrate how culture affects values and attitudes about the environment using examples such as frontiersmen, Indians, farmers, city dwellers, etc.	L.A., S.S., C.A.
7-9	39.	observe and report on persons he knows who promote love, comfort, understanding and a positive self-concept.	S.S., Sc., C.A.
7-9	40.	investigate factors influencing man's attitude toward his environment and explain how man expresses these attitudes through many forms of communication. (Consider verbal and nonverbal.)	S.S., L.A., C.A.
7-9	41.	observe and report on ways in which actions have affected or violated the rights of others.	L.A., S.S., Sc., B.
7-9	42.	evaluate local community zoning regulations in terms of their effects on the quality of life.	S.S., H., B.

7-9	43.	react to the following situation: A man with a small farm on the edge of town cannot raise enough food to feed his cows and he cannot buy more land. What should he do and why?	Sc.,S.S.,B.
7-9	44.	discuss environmental conditions which encourage people to improve their lives.	S.S.,H.,B.
7-9	45.	predict future living problems in large cities if long-range planning does not provide adequately for the humanistic needs of man.	S.S.,H.,Sc.,L.A., C.A.
7-9	46.	propose a flexible plan for community development which provides for human needs.	S.S.,H.,Sc.,B.
7-9	47.	write and present a program illustrating how continuance of man's present life styles will affect the quality of life.	S.S.,H.,Sc., L.A.,B.
7-9	48.	describe the adequacy of emission controls (smoke, fumes, solids, liquids) at one community industrial site based on data obtained by systematic observation.	S.S.,Sc.,H.
7-9	49.	present data on how industrialization may both positively or negatively affect areas.	S.S.,H.,B.
7-9	50.	inventory community recreational activities and predict the future of each based upon current environmental practices. (Example: polluted lakes, misused parks, local population trends, etc.)	S.S.,H.,B., Sc.,

7-9	51.	discuss whether science, law, technology and money will be able to solve environmental problems without also changing people's values and attitudes.	S.S.,H.,Sc., B.
7-9	52.	propose and implement a system for recognizing businesses which employ good environmental practices.	L.A.,B.
7-9	53.	calculate water yield and water consumption for his county and relate this to projected water needs.	H.,M.,Sc.,S.S.,B.
7-9	54.	compare the quality of local surface water with rain water.	H.,Sc.
7-9	55.	identify problems resulting from intensified agricultural production such as feed lots and enriched fertilizer.	V.A.,H.,Sc.
7-9	56.	observe various types of flood plain usage and differentiate between good and poor uses.	S.S.,V.A.,H. Sc.,B.
7-9	57.	relate land drainage practices to water supply, wildlife needs and CO_2 - O_2 balance in the atmosphere.	Sc.,V.A.,H.
7-9	58.	identify factors which cause lake eutrophication and suggest practices which will slow the process.	S.S.,Sc.,H.,V.A.
7-9	59.	compare the organisms living in fresh bodies of water with those in water undergoing eutrophication.	Sc.,H.
7-9	60.	conduct a study to determine the environmental impact of	S.S.,H.,Sc.

		power boats on a body of water.	
7-9	61.	research environmental implications of using colored paper products.	H.,Sc.
7-9	62.	evaluate the adequacy of the local sewage treatment facility.	S.S.,Sc.,H.
7-9	63.	calculate the cost (per user) of adding tertiary sewage treatment for his or a nearby city and debate a resolution for such installation.	M.,H.,B.
7-9	64.	discuss current federal, state and local laws which affect his community's method of sewage treatment.	Sc.,S.S.,H.,B.
7-9	65.	discuss economic and ecological reasons for future utilization of sea water.	S.S.,Sc.,H.,B.
7-9	66.	analyze the merits of various modes of transportation that might be used in an urban area and propose a transportation plan for his community.	S.S.,B.,Sc.
7-9	67.	debate the resolution: "Billboard signs should be banned."	C.A.,L.A.
7-9	68.	evaluate "environmentalists'" demands for anti-pollution devices in automobiles.	S.S.,H.
7-9	69.	test a plant's ability to grow in polluted air such as near a factory or traffic congested area.	Sc.

7-9	70.	gather data about respiratory illnesses in the area and state a hypothesis about the cause of respiratory problems.	H.,Sc.
7-9	71.	design a land use plan for his town or community which will maximize the quality of life.	S.S.,C.A.
7-9	72.	choose an occupation which interests him and write a brief report explaining his choice and its potential relation to the quality of life.	S.S.,L.A.
7-9	73.	express his opinion, using various media, on how increased leisure time has influenced change in land use in his community, county or state.	L.A.,S.S.,Sc., H.,C.A.
7-9	74.	evaluate five new products seen advertised recently on television in terms of their potential impact on the environment.	L.A.,B.
7-9	75.	describe problems which may occur if a community of 3,000 were to grow rapidly to 50,000 without land use planning.	H.,Sc.,L.A.,S.S.
7-9	76.	list and evaluate four government activities aimed at improving health.	S.S.,Sc.,H.
7-9	77.	describe life styles which he feels are ecologically sound.	S.S.,Sc.,L.A.

7-9	78.	evaluate the merits of the statement: "Bigger is not necessarily better, slower can be faster, and less can be more."	S.S.,B.,L.A.
7-9	79.	identify animals which have adapted and proliferated as a result of urbanization.	Sc.,S.S.
7-9	80.	use an art form to depict leisure-time activities which contribute to environmental stresses.	C.A.,S.S.
10-12	81.	prepare a presentation depicting the life of young people and adults from another segment of society.	L.A.,S.S.,C.A.
10-12	82.		
	A.	report on psychological and sociological stresses in urban areas.	H.,Sc.,S.S.,Psy.
	B.	report on the advantages of living in metropolitan centers.	H.,Sc.,S.S.,Psy.
	C.	prepare a report suggesting ways to improve the quality of life in urban areas.	S.S.,Sc.,H.,L.A., Psy.
10-12	83.	evaluate various fashions and modes of dress in terms of their environmental impact, e.g., recycling of materials, energy used in production, heating and ventilation of building, etc.; write a dress code for his school which he feels is practical, ecological and implementable.	H.Ec.,S.S.,H.,Sc.
10-12	84.	identify and explain the conditions in his community	H.,S.S.,Sc.,Psy.

		which have affected its productivity and/or livability.	
10-12	85.	gather data which shows that the availability of natural resources greatly affects the quality of life.	Sc.,H.,S.S.
10-12	86.	develop a presentation describing what his community would be like with the removal of one resource.	L.A.,H.,S.S.,Sc.
10-12	87.	prepare an editorial about a community problem.	L.A.,S.S.,H.,C.A.
10-12	88.	research and prepare a movie or videotape which explains a local ecological problem.	L.A.,Sc.,H.,C.A.
10-12	89.	develop a display or other presentation which depicts life style changes in his community during this century.	L.A.,S.S.,C.A.
10-12	90.	analyze and report on societal factors which affect his attitudes and values.	L.A.,S.S.,C.A.
10-12	91.	design a program to correct a local environmental problem.	S.S.,H.,Sc., L.A.,C.A.
10-12	92.	assess zoning regulations in terms of environmental considerations.	S.S.,H.,B.,V.A.
10-12	93.	develop an inventory and construct a map of a downtown area showing rivers, parks, wildlife areas, aesthetic areas, trees and other interesting natural features.	C.A.,S.S.
10-12	94.		
	A.	survey the community to determine usage of local parks.	H.,P.E.,S.S.,L.A.

	B.	suggest a plan for improving the quality of park utilization.	H.,P.E.,S.S.,C.A., L.A.
10-12	95.	design a restoration plan for his city based on humanistic considerations.	S.S.,C.A.,L.A., H.,Psy.
10-12	96.	collect data on human behavior relevant to the solution of a city's traffic problems.	S.S.,H.,Sc.,Psy.
10-12	97.	prepare a traffic plan for his city which provides for the reduction of problems of traffic, noise, parking, etc.	S.S.,H.,C.A.,L.A.
10-12	98.	suggest ways shopping center parking lots can be constructed to better utilize the natural environment.	S.S.,C.A.,B.
10-12	99.		
	A.	plan an audiovisual experience depicting various (visual) aesthetic characteristics of his community.	C.A.,S.S.,L.A.
	B.	suggest a plan for improving or maintaining the aesthetics of his community.	C.A.,L.A.,S.S.,Sc.
10-12	100.	develop a documentary on the necessity of including environmental impact consideration in making all public and/or private decisions.	S.S.,H.,C.A.,L.A., Sc.
10-12	101.	react objectively to: "A country must constantly increase its Gross National Product to prosper."	B.,S.S.,L.A.

10-12	102.		
	A.	identify a business or industry which employs a large number of people but whose operation causes considerable damage to the local and/or downstream - downwind environment.	S.S.,H.,B.,Sc.
	B.	prepare a report outlining the economic, political and ethical considerations which the board of directors of the above organization must evaluate in arriving at a decision to either close the plant or massively invest in additional pollution control devices.	S.S.,H.,B.,L.A.,
10-12	103.	debate the issue: "An industrial company should voluntarily install pollution control devices in the absence of industry-wide regulations or agreements on emission levels."	B.,Sc.,H.,S.S.,L.A.
10-12	104.		
	A.	formulate a plan for the location and construction of needed major industries, utilities or public installations in his community.	S.S.,H.,B.,C.A., Sc.,L.A.
	B.	develop an adequate environmental impact study for one of the installations.	S.S.,H.,B.,Sc.,L.A.
10-12	105.	secure a copy of an environmental impact study that has been submitted to the Environmental Protection Agency and evaluate its completeness.	S.S.,Sc.
10-12	106.	assess the environmental impact practices of local, state and federal highway agencies.	S.S.,H.,Sc.,C.A.

10-12	107.	select a nearby construction project (highway, houses, school, etc.) and determine whether the contractor and/or developer is adequately providing for the maintenance of the environment during the period of construction.	S.S.,B.,Sc.
10-12	108.	identify roles which governments, institutions, and organizations can logically assume in repairing environmental damages.	S.S.,H.,B.
10-12	109.	debate the issue: "The solution of environmental problems is the sole responsibility of science and technology."	B.,L.A.,S.S.,Sc.
10-12	110.	project the effect of proposed nuclear power plants on water quality and usage if construction plans do not include thermal and pollution control devices.	H.,S.S.,Sc.,M.
10-12	111.	explain the economic, health and ecological implications of such city practices as street flushing, salting, etc.	H.,S.S.,Sc.
10-12	112.		
	A.	identify problems resulting from chemical, insect and weed control.	V.A.,H.,S.S.,Sc.
	B.	suggest workable alternatives to chemical controls which will provide for an adequate food supply.	V.A.,H.,Sc.,B.
10-12	113.	map and explain why the development and location	S.S.,H.,B.

		of America's largest cities depended on an adequate supply of usable water.	
10-12	114.	predict the future of all forms of life if the nation's waters are increasingly polluted by an increasing population and water treatment does not keep pace with the population's demand for water.	H.,S.S.,Sc.
10-12	115.	compare dollars needed for cleaning up waterways to the current local, state and federal appropriations and assess which components of these funds need to be increased.	S.S.,H.,Sc.,B.
10-12	116.	list effects of polluted air on his life.	S.S.,H.,B.
10-12	117.	relate the "Green House" effect to weather change.	Sc.,H.
10-12	118.	document that air pollution is a direct effect of industrialization in developing societies.	B.,H.,S.S.
10-12	119.	construct the conditional situation which would encourage industries and utilities to improve their air quality.	S.S.,B.
10-12	120.	acquire and study current air pollution legislation.	S.S.,H.,Sc.,B.
10-12	121.	analyze and report on the environmental trade-offs involved in the nitrogen cycle, e.g., consider providing adequate protein diets vs water nitrification.	V.A.,Sc.,H.,S.S., H.Ec.
10-12	122.	secure and test foods for insecticide or pesticide contamination.	Sc.,H.,H.Ec.,V.A.

10-12	123.	contrast an early colonist's value system with that of ours today in terms of land and resource use.	S.S.,V.A.,B.,C.A.
10-12	124.	investigate religious and non-religious historical figures to discover the effects of religion on man's attitudes and values toward his environment.	S.S.,L.A.
10-12	126.	contrast the Judeo-Christian philosophy to the Hindu philosophy with regard to man's stewardship/ownership role.	L.A.,S.S.,C.A.
10-12	126.	interpret his own feelings toward mankind and his environment by means of a collage, poem or skit.	L.A.,Sc.,S.S.,C.A.
10-12	127.	write a paper describing relationships between a man's cultural, social or economic experiences and his attitudes and values toward the environment.	L.A.,S.S.,B.
10-12	128.	give examples of short-term gains that may well become long-term losses.	S.S.,B.
10-12	129.	write a paper or give a speech illustrating the environmental ramifications of Pogo's statement: "We have met the enemy and he is us."	S.S.,L.A.,H.,Sc.
10-12	130.	evaluate various life styles and value systems existing in his community, nation and the world in terms of providing optimum short-term and long-term benefits for himself, society and the environment.	YOUR CHOICE

VII. CURRICULUM RESOURCES

Many schools, publishing companies, governments and private organizations have already developed environmental information materials. The list is endless. Rather than listing every publication, the following lists of individuals and agencies which your school district may contact for free and inexpensive materials and services is provided:

		Cost
1.	Dr. George Parker Department of Forestry & Conservation Purdue University Lafayette, Indiana 47907 Ask for:	
	Environmental Education, Education for the Seventies	$2.50
	This publication lists curriculum materials, films, pollution games, guidelines from the National Education Association, lesson plans, resource agencies, etc.	
2.	Dr. John Moody Division of Education Indiana University, Southeast Warder Park, P.O. Box 459 Jeffersonville, Indiana 47130	
	"Free and Inexpensive Environmental Education Resource Materials for Elementary and Secondary Teachers."	$1.00
3.	National Education Association 1201 Sixteenth Street, N. W. Washington, D.C. 20036 Ask for:	
	Environmental Education Bibliography	Free
4.	National Wildlife Federation 1412 Sixteenth Street, N.W. Washington, D.C. 20036	
	Conservation Directory	$1.50
5.	American Camping Association Bradford Woods Martinsville, Indiana 46151 Ask for:	

		Cost
	Catalog of Publications This agency has environmental education curriculum materials in its bookstore at Bradford Woods.	Free
6.	Curriculum Research and Development Center Indiana State University Terre Haute, Indiana 47808 Ask for:	
	Conservation Education Bibliography This publication lists free and inexpensive materials available to schools.	Free
7.	Science, Mathematics, and Environmental Education Information Analysis Center (SMEAC) 400 Lincoln Tower Ohio State University Columbus, Ohio 43210 Phone No.: 614/422-6717	
	SMEAC, a subsystem of ERIC, maintains a clearing house for environmental education curriculum materials. Ask for information about environmental education programs and newsletters. When asking for information, specify the particular problem you would like researched. Often a phone call is better than a letter since this allows the staff to identify the specific type of materials you need.	
8.	Hoosier National Forest 1615 "J" Street Bedford, Indiana 47421	
	Conservation Tools for Educators A curriculum guide for grades 1-12.	Free
	Teaching Conservation Through Outdoor Education Areas An excellent guide for developing an outdoor classroom.	Free
	Help for Environmental Education Programs Lists many agencies you can contact for environmental education materials.	Free

		Cost
9.	Soil Conservation Service (Each county seat, except Tipton, has an SCS office.) Ask for:	
	Teaching Materials: a. Elementary b. Secondary	Free
	Teaching ideas for all subject areas.	
	Outdoor Classroom An excellent guide for developing an outdoor laboratory or nature center.	Free
10.	Izaak Walton League 1800 N. Kent Street Arlington, Virginia 22209 Ask for:	
	Environmental Practices A book filled with environmental ideas and challenges.	$1.25
11.	National Audubon Society 950 Third Avenue New York, New York 10022 Ask for:	
	Audubon Aids	Free
12.	Division of Health Education Indiana State Board of Health 1330 West Michigan Street Indianapolis, Indiana 46204 Ask for:	
	List of Materials	Free
13.	a. Joe E. Wright Environmental Education Consultant Division of Curriculum Indiana State Department of Public Instruction Room 108, State Office Building Indianapolis, Indiana 46204	
	b. Michael Price Environmental Education Consultant Office of State Superintendent Southern Regional Service Center	

Cost

511 Fourth Street
Huntingburg, Indiana 47542

c. Jack Snell
Environmental Education Consultant
Office of State Superintendent
Northern Regional Service Center
635 South Main Street
South Bend, Indiana 46623
Ask them for:

1. Consulting Services — Free
2. Workshops

14. Environmental Education
Office of Priority Management
Office of Education
400 Maryland Avenue S.W.
Washington, D. C. 20202
Ask for:

Environmental education materials and guidelines. — Free

15. Education Department
American Association for the
Advancement of Science
1515 Massachusetts Avenue N.W.
Washington, D.C. 20015
Ask for:

Science for Society - A Bibliography — $1.00

Almost 4,000 references, many annotated, are included. All aspects of the interrelations of man, society, environment, science and technology are covered. Titles are classified and indexed in major and minor categories.

16. Jack Hart
Hayes Regional Arboretum
801 Elks Road
Richmond, Indiana 47374
Ask for:

Information about Project S.E.E. (SELF-EARTH ETHIC)

Cost

This K-12 interdisciplinary environmental education curriculum is being developed by the Hayes Arboretum staff, Indianapolis Public Schools and Ball State University and supported by the Indiana State Department of Public Instruction.

17. Frank H. Bozarth
Assistant Executive Director
Indiana Tuberculosis & Respiratory Disease Association
30 East Georgia Street, Room 401
Indianapolis, Indiana 46204
Ask for:

a. Air Pollution Primer — Free
b. Air Pollution Experiments for Junior and Senior High School Students.

Excellent resource materials for teaching air pollution.

18. Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
Ask for:

Environmental Education Programs and Materials — $1.00
Prep Report No. 33

Identifies and explains in detail the best on-going and available curriculum projects. An excellent investment for beginning or improving environmental education curriculum.

19. Robert O. Ellingson
Conservation Education Association
Box 450
Madison, Wisconsin 53701
Ask for:

Conservation Education Bibliography — $1.50

A compilation of the latest environmental resource materials, curriculum, etc.

		Cost
20.	Jerry M. Colglazier State Science Consultant Indiana Department of Public Instruction Room 108, State Office Building Indianapolis, Indiana 46204 Ask for:	
	Guidelines for Indiana School Science Programs K-12 This publication contains additional environmental education objectives. Your school has been sent a copy of this guide.	Free
21.	Soil Conservation Society of America 7515 Northeast Ankeny Road Ankeny, Iowa 50021 Ask for:	
	Plants, How They Improve Our Environment	$.25
22.	Conservation and Environmental Studies Center Whitesboro, New Jersey 08252 Ask for:	
	The World Around Them: Environmental Education in the Urban Environment	$2.00
23.	Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402 Ask for:	
	Air Pollution Publications: A Selected Bibliography with Abstracts 1966-1968, 532-page paperback book	$4.50
24.	American Psychological Association 1201 Seventeenth Street, N.W. Washington, D.C. 20036 Ask for:	
	Environment and the Social Sciences: Perspectives and Applications	$5.50
25.	Contact your Silver Burdett representative to obtain information on the U.S.	

		Cost
	Park Service's National Environmental Education Development (NEED) program.	
26.	Group for Environmental Education, Inc. 1214 Arch Street Philadelphia, Pa. 19107 Ask for:	
	Our Man-Made Environment	Free
27.	National Education Association Publications-Sales Section 1201 16th St.,N.W. Washington, D.C. 20036 Ask for:	
	Man and His Environment	$1.75
	An introduction to planning and using environmental study areas.	
28.	Teaching for Survival, a handbook for Environmental Education, by Mark Terry. Ballantine Books #02120-7-125.	$1.25
29.	People and Their Environment, Ind. Div. c/o Douglas Andrews J. G. Ferguson Publishing Company 100 Park Avenue New York City, New York 10017	
	People and Their Environment	
	K-12 interdisciplinary environmental education curriculum guide. In some areas guides may be obtained at no charge through the Garden Club of Indiana, Inc. Contact your local garden club.	
30.	People (World Population Data) Columbia Books, 425 Southern Bldg.,N.W. Washington, D.C. 20005	$1.50
	This publication contains excellent data concerning population growth.	